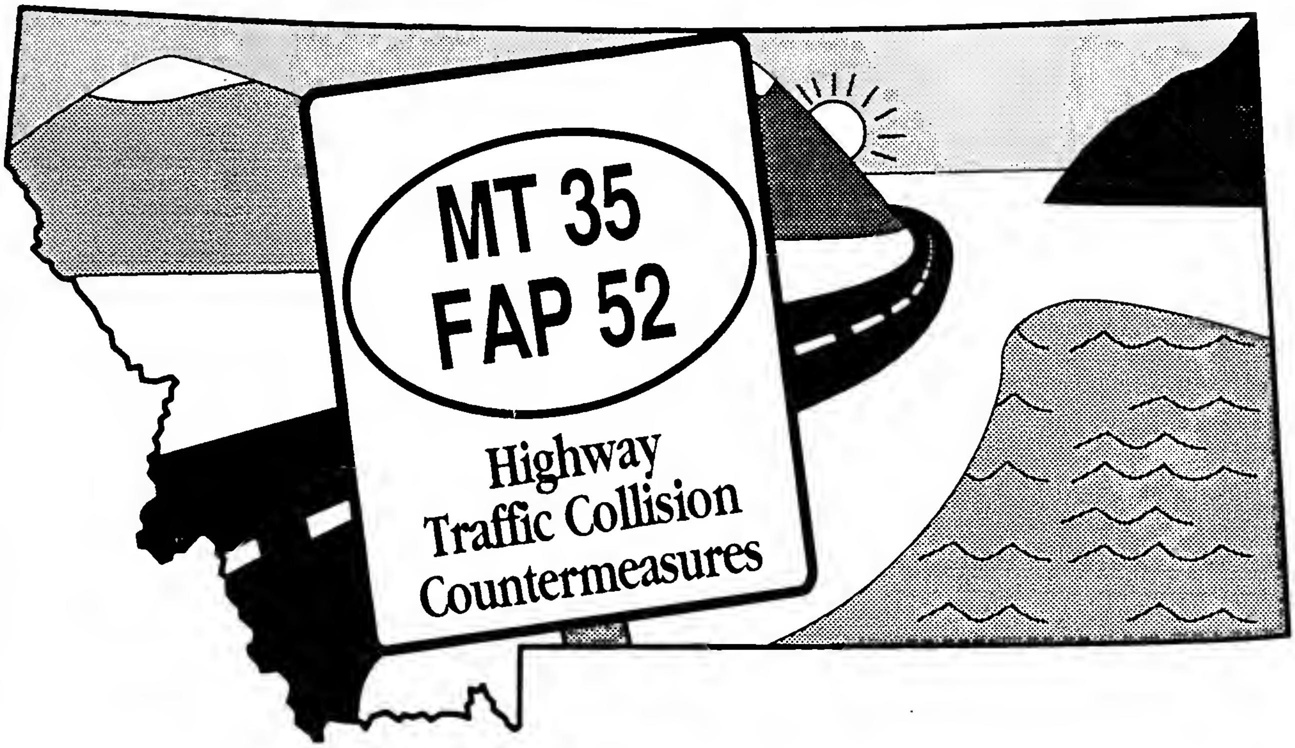

Prepared by
Multi-disciplinary Traffic Safety Task Force
State of Montana
Helena, Montana 59620
December 1992

HIGHWAY ACCIDENT COUNTERMEASURES FOR AGING DRIVERS ON MT 35 CORRIDOR

Milepost 0 to Milepost 33.4

Working Paper, Prepared By
Multi-Disciplinary Traffic Safety Task Force
State of Montana

November 1992

Acknowledgements

This paper regarding a higher accident corridor represents a cooperative effort by the multi-disciplinary traffic safety task force. Generally the purpose of the team is to promote highway traffic safety issues. It is intended that the committee review, initiate, or implement highway safety projects or programs that are integrated with surface transportation improvements and human behavior safety efforts. This team sincerely hopes their effort results in a transportation environment that promotes the well being of the people who travel Montana's streets and highways. As can be noted below, several state agencies as well as the Federal Highway Administration are represented on the team.

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Table of Contents

HIGHWAY ACCIDENT COUNTERMEASURES
ON MT 35 CORRIDOR - M.P. 0 to M.P. 33.4

I. Summary

The greatest number of rural transportation-related traffic accidents take place on a relatively small percentage of our roadways. Generally these large number of collisions occur on free-access, high-volume facilities that have traffic speeds of at least 40 miles an hour and are adjacent to an unusual amount of roadside development. Although the accident rates in Montana and the nation have significantly declined in the last 10 to 15 years, it is predicted that by early next century our national public highway system will experience 60,000 or more deaths as a result of increasing traffic volumes.

In an attempt to further reduce the accident rates on Montana's higher volume roadways (high speed arterial rural road), the Montana Traffic Safety Task Force researched high-accident corridors. The team recognized the benefits of two (2) previous year's elderly corridor research projects and believed further achievements could be derived by expanding this concept. This effort resulted in a product which provides a consistent traffic control environment for drivers from the southern end of Montana to approximately the city of Kalispell.

This project's basic objective is to reduce traffic accidents on a corridor with a significant attempt to relate to the aging driver's needs. This effort applies an integrated approach to accident reduction countermeasures.

Research data showed MT 35 from the city of Polson to just north of Big Fork as having unusual amounts of traffic collisions and about 14% of those accidents involving older drivers (age 60+). A 33-mile corridor was selected for study and this paper attempts to identify improvements and programs to reduce the number of accidents along this roadway. Maps illustrating major highways in Montana and the study area follow on page six and seven, respectively.

This report also outlines five areas detailing recommendations regarding education, enforcement, licensing, engineering, and the safety team. These recommended programs and projects are consistent with the previously completed projects. Suggestions regarding traffic control improvements to the entire corridor and detailed recommendations at eight accident concentration locations follow. Included are public service announcements for the aging driver together with informational handouts concerning drivers' vision, reactions, medication, alcohol and pedestrian safety. As in the previous efforts, a driver's self assessment test was also adopted. The recommendations resulted in suggestions for law enforcement agencies to target their activities towards such things as: 1) improper passing, 2) failure to drive to right, 3) use of seat belts, 4) no drivers license, and 5) had been drinking.

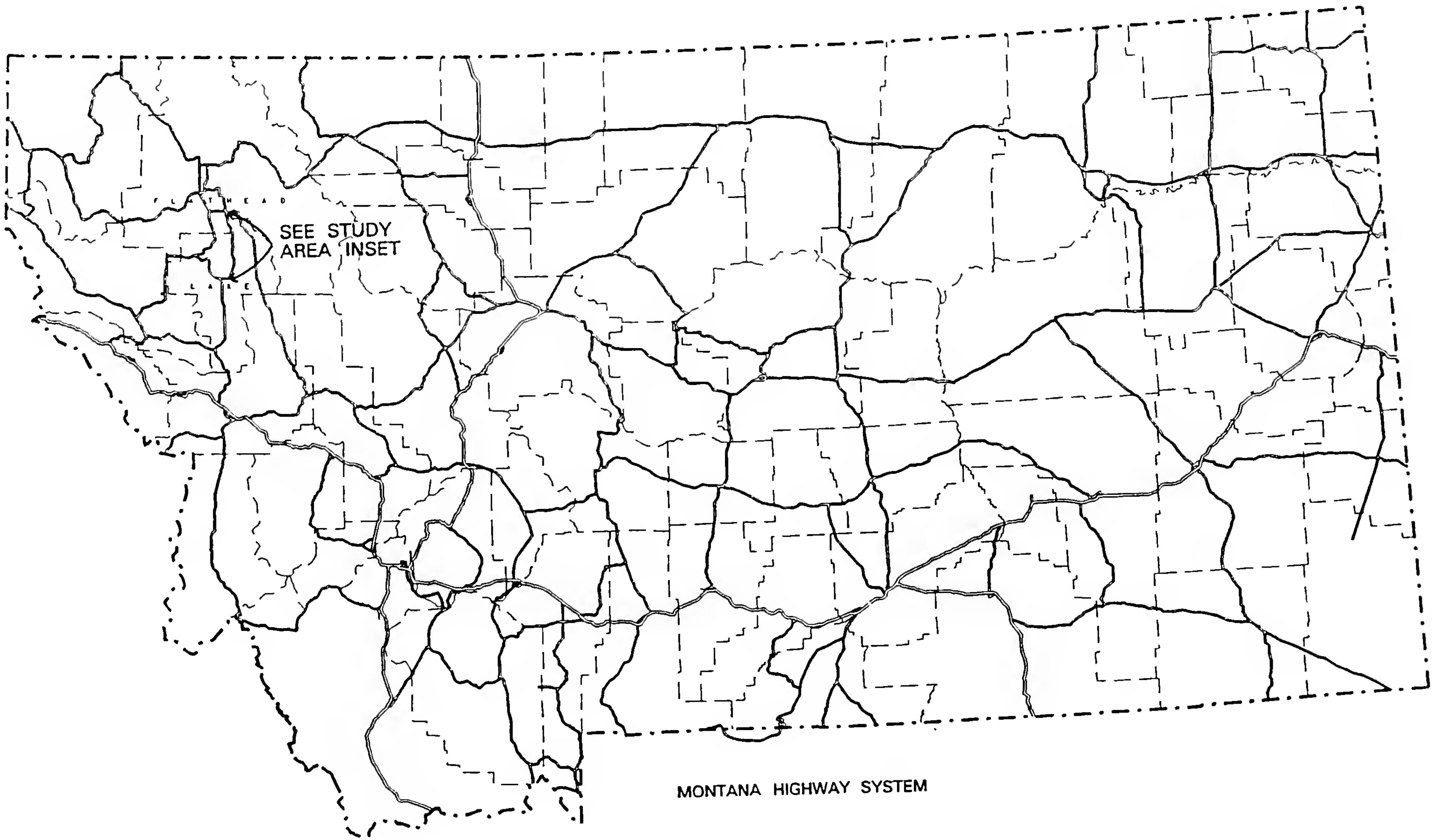
It was found that communities along this corridor have very high percentages of older citizens. Lake County and the city of Polson are major communities within the study corridor. In 1990, 26% of

Polson's population was over the age of 60, compared with approximately 17% for Montana and the rest of the nation.

We reviewed available literature regarding accident reduction issues and remedies. We looked for low- and no-cost counter-measures and improvements, particularly ones that could be implemented quickly. Overall improvements should benefit the entire driving population.

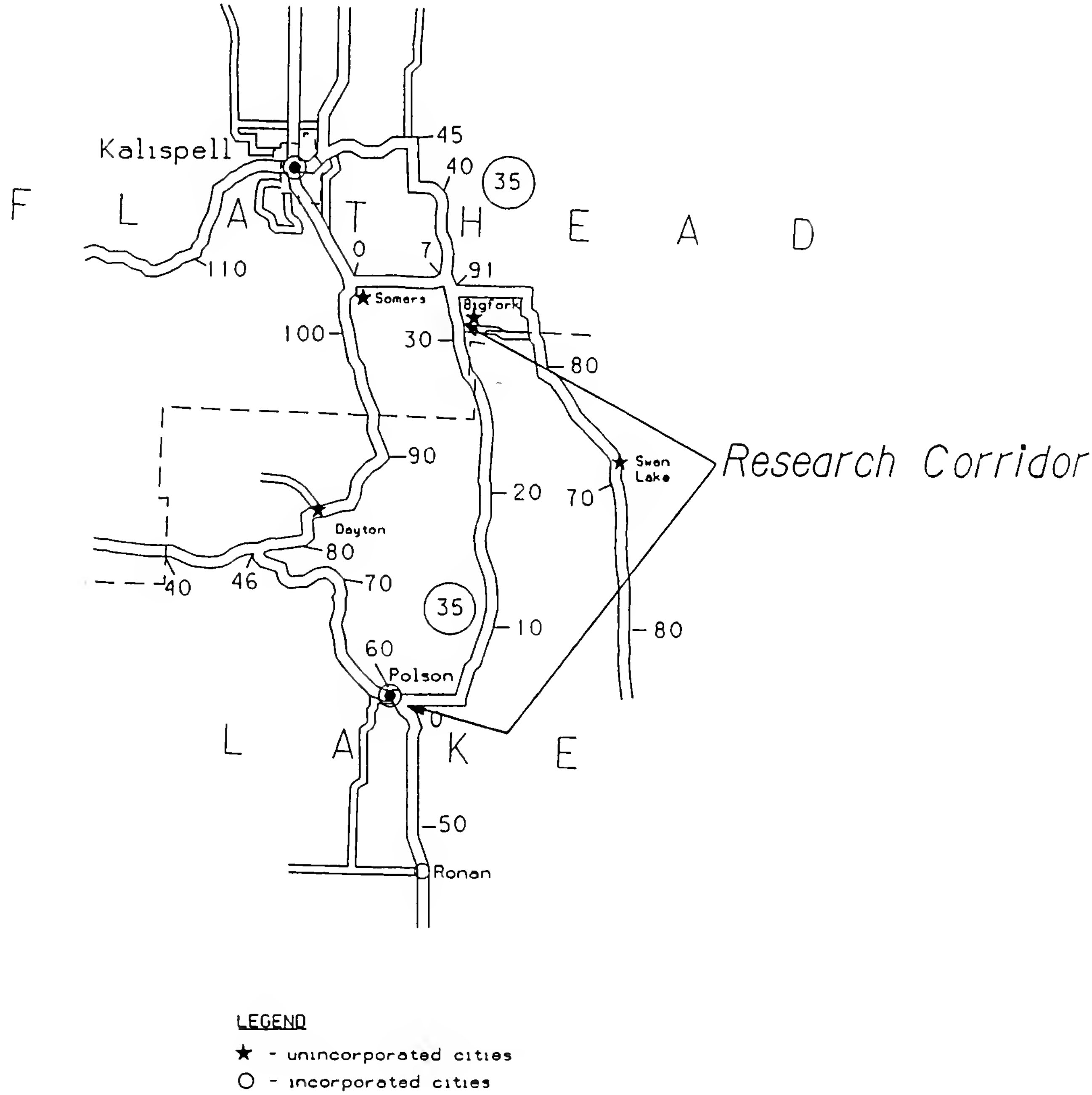
As of this date, the last two (2) U.S. 93 Corridor Highway Safety Improvement Programs are considered successful. Full implementation of the recommendations on U.S. 93 South of Missoula was completed in November of 1992. The 60-mile corridor improvements on U.S. 93 north of Missoula should be implemented by June, 1994.

All three (3) studies have generated cooperation by its interdisciplinary approach to solving highway safety problems. In addition to the involvement of various agencies, major support has come from local officials and we anticipate the same positive reaction from media members in areas adjacent to the corridors. We also anticipate increases in communication and cooperation as related to highway safety programs between federal and state agencies as well as local government.



MONTANA HIGHWAY SYSTEM

Study Area Inset



M.T. 35 – POLSON TO BIG FORK RESEARCH CORRIDOR

II. Roadway Selection

The group reviewed all of the major highways of Montana. We searched thirty-mile roadway segments for accidents. US 93 and MT 35 stood out as having a large number of total as well as older driver accidents. We focused on a segment of this highway from Hamilton to just south of Missoula in 1990, from Missoula to Polson in 1991, and this paper on research regarding MT 35 from Polson to just north of Big Fork.

According to the thirty-mile segment analysis, U.S. Highway 93 from Darby to Missoula had the highest number of older driver traffic accidents in Montana. This stretch was followed closely by U.S. 93 from Missoula to Polson and by MT 35 from Polson to Big Fork.

This paper concentrates on a corridor from milepost 0 to milepost 33.4 on F.A.P. 52 to analyze the accidents and the related roadway environment. There were 56 traffic accidents involving older drivers during the time period of January 1, 1988, to January 1, 1992. This is about 14% of the total 403 traffic accidents for this period along this highway segment.

Original Montana Highway Patrol accident reports were examined to create accident diagrams for the study segment of MT 35. Several reports indicated that drivers had difficulty with conflict points, generally intersections and driveways. However, a variety of types and causes of traffic accidents were evident across the whole travel and commuting area. All accidents in this corridor showed drivers over-representing or having problems with fixed objects, darkness, driveways, wet or icy roads, weekends, and during the summer months.

In 1988, Lake and Flathead Counties completed a traffic accident cluster area study and implemented improvements at about 40 locations on county roads. This included changing signs, delineation and pavement markings on county roadways adjacent to the study area. We believe this effort helped the aging driver's problems as well as the general driving public.

III. Countermeasures and Improvements

Aging drivers are not a single homogeneous group nor definable solely by chronological age. Considerable individual differences in knowledge, skills and abilities exist within all age groups. Programs designed for an aging driver must start, however, with a generalized profile and one probably ordered around two or more cohort groups, perhaps those aged 60 to 69, and 70+.

Highway design and operations engineers commonly use a concept called the "85th percentile driver" as the standard when planning roadway construction and improvement. Not everyone agrees with the use of the "85th" percentage value. Some research suggests that highways be designed to accommodate a higher percentage of the motoring public such as the 95th, or perhaps the 99th percentile.

Use of higher percentage may be warranted as older drivers are more likely to be included in the higher percentiles. Highway design, construction and maintenance will need to keep pace with society's aging. Research also suggests that it may be desirable to undertake more intensive physical and social improvements in or near retirement communities to assist the older drivers.

Highway engineers are paying more attention to the special characteristics and capabilities of older drivers. Roadway designs and improvements to accommodate aging include:

1. creating traffic signs and signals of an appropriate size, graphically simple and clear as possible;

2. recognizing that aging may cause difficulty with certain colors and visibility which makes the use of color and reflectivity contrasts important;

3. making extensive use of advance warning and information signing;

4. using more readily visible delineation and markings for pedestrian crossings to help pedestrians and drivers;

5. narrowing the visual search area by careful placement of traffic signals; and,

6. simplifying intersections whenever possible.

Research shows delineation and sign visibility are two areas that can help the safety record of the senior drivers. There may be a need for wider edge lines, longer dashes, and a shorter strip-to-gap cycle. Other roadway delineators which could be used include painted and reflectorized guardrail and delineator posts. Increasing sign luminance together with good contrast and letter size promotes increased legibility. Some researchers feel highway signs and markings should be designed to work for all drivers, including those with poor vision and even those under the influence of alcohol or drugs.

We propose addressing the needs of aging drivers using several approaches. These should be integrated into a program for accident prevention and reduction. The following five-part program and various countermeasures and improvements are proposed.

A. Multi-disciplinary Safety Team

The safety team will periodically review and analyze, coordinate, and implement methods for lowering the number of accidents involving the general traveling public and aging drivers within this and other corridors. Members of the team include key personnel from federal and state highway departments and the Montana Department of Justice. Persons assigned to the team from state or federal agencies are authorized to commit their agency's resources at least to some level.

The mission of the team is, (1) to review the status of physical and social conditions affecting driving along accident-ridden corridors, and (2) to seek majority or consensual position on countermeasures and improvements to reduce roadway accidents. Data, information and research must be compiled prior to meetings in order to produce sound decisions regarding countermeasures and programs. The development of the team has provided the opportunity to advance highway traffic safety on U.S. 93.

B. Public Education

Public information should be directed to the senior drivers and their associations as well as to the general driving public. More use of the media could be made to publicize specific highway traffic safety issues. Public agencies already provide significant amounts of information on accident types and causes as well as the roadways involving aging problems. New materials could target the aging driver and be distributed to all drivers at license renewal times.

Additionally, public information and education should be used in conjunction with law enforcement actions suggested in the next section. Warning the public, reminding them of specific enforcement actions and consequences, and keeping them apprised of the need and results of actions is warranted. An informed public will help to reduce injuries, fatalities and economic loss from highway traffic accidents. Too, an informed public is the best social and political force to achieve desirable changes.

Recently produced public service announcements narrated by Chuck Yeager were obtained along with permission to use them in Montana. They cover issues of vision, safety belts, pedestrians, changing laws, and medication. Contact and cooperation in developing and distributing applicable information and education should be sought with driver education specialists, associations of elderly, local county-city governments, and public interest groups. A listing of key contacts for the senior drivers is also included in the Appendix.

The first working paper on this corridor developed most of the public information, education and public service announcements directed towards the senior driver. See Appendix for details.

Three nationally prominent older driver education programs are approved in Montana. These are: (1) the National Safety Council (NSC) "Coaching the Mature Driver", (2) the American Association of Retired Persons (AARP) "55 Alive/Mature Driving", and (3) the American Automobile Association (AAA) "Safe Driving for Mature Operators". All three provide adequate coverage of the information needed to address the driving knowledge deficiencies of older drivers and the accident situations in which they are over-involved. Therefore, it was not necessary for the team to develop another older-driver education program.

C. Enforcement

It is said people become creatures of habit, but some driving habits are too risky. Selective police enforcement warnings and citations should be issued at high accident locations and coupled with public education efforts. A speeding citation requires a driver to reconsider his or her personal safety behavior and to reduce the risks he or she takes when driving. Seat belt citations similarly remind drivers and passengers to save themselves and others.

We believe that firm signals must be sent to all drivers. Special enforcement of traffic laws should occur regularly on high accident roadways. Enforcing speed, safety restraint use, and anti-drinking and driving laws provides the best deterrence for most drivers to obey traffic laws. Safety spot checks by the Montana Highway Patrol for example, incorporate enforcement and education effectively.

Law enforcement officials are conscious of the negative impact of stops, warnings and citations. However, they also realize they perform as a "role model" for many youth and most adult drivers and consequently must follow the highest standards of driving safety and use of restraints. Laxity in enforcing traffic laws, therefore, sends a poor signal to the driving public and thwarts the effectiveness of existing or new countermeasures to help all drivers.

Consistent with the previous two (2) corridor studies, we recommend that the team or their representatives meet with all law enforcement agencies along the corridor to discuss the accidents, causes, results, recommended improvements and countermeasures. Sufficient time should be allowed to fully understand the issues, problems and needs that are amenable to improvement or beneficial change by law enforcement's awareness and actions. Information from this study and other material could be sent to the head of each law enforcement agency in advance of a meeting. This would inform law enforcement of the discussion to be held and alert them to the need for their participation. Based upon our accident data we found several law enforcement concerns directly relating to the collisions. These collisions include: 1) Improper passing, 2) Failed to Drive to Right, 3) Seat belts not used, 4) No Driver's Licenses and, 5) Had Been Drinking, etc.

D. Licensing

Several things might be done in the area of testing and licensing of drivers. By enhancing the licensing screening procedures, and working with existing driving training programs, more drivers confronting aging would be reached than through sole reliance on general public information and education efforts. Use of self-tests, new visual and manual testing equipment, supplemental driving training and tests, would help drivers identify more difficulties due to aging.

Overall the intent is to reach drivers sooner than later. We must allow them to decide what their limits are and what to do about it at the same time they consider their needs for independence and mobility. A driver's license is not only a form of identification, it has to some become evidence of their competence and ability for many years. We found no "final" solutions in the research that magically waived an individual's or society's responsibility when deciding who drives when and how.

Included in the Appendix is a copy of AAA's newly developed self-test. The Highway Traffic Safety Division has adopted and will use it in helping all drivers understand the issues and the impacts of aging. Also, new technologies and procedures used in other states will be continually examined to find the most fitting changes to use in testing, licensing and processing of all drivers. Where changes are desirable, vigorous efforts should be made to find the resources to finance these improvements.

E. Engineering

Several areas of the roadway environment need to be addressed. These include highway signs, roadway markings, and intersection design. Specific illustrations and recommendations follow.

1. Montana 35 Corridor - General Recommendations

We recommend that all four-inch-wide pavement markings be increased to six-inch markings and applied with epoxy paint. Principally this involves increasing edge line markings. However, we recommend the centerline also to be considered. Daytime headlight use is also recommended for this roadway. Since this roadway parallels the east shore of Flathead Lake, there is a significant amount of fill area with slopes of 1:1 foot. About three (3) miles of these slopes are in areas with more than 40 foot drops to the lake or bottom of the slope. We believe that at least 3 miles of guardrail treatment should be considered in the near future by the MDOT.

A total review of the adequacy of all signs and their supports along the corridor is recommended as most should be replaced at this time. Three major reasons for this recommendation are: (1) many traffic control signs need adjustment in their placement, (2) the average age of these signs is a concern and, (3) many sign supports are installed incorrectly or in recent years received poor maintenance. We recommend higher reflectivity sign sheeting for this corridor with contrast techniques applied to major guide signs. This may require a combination of sign sheeting. Research

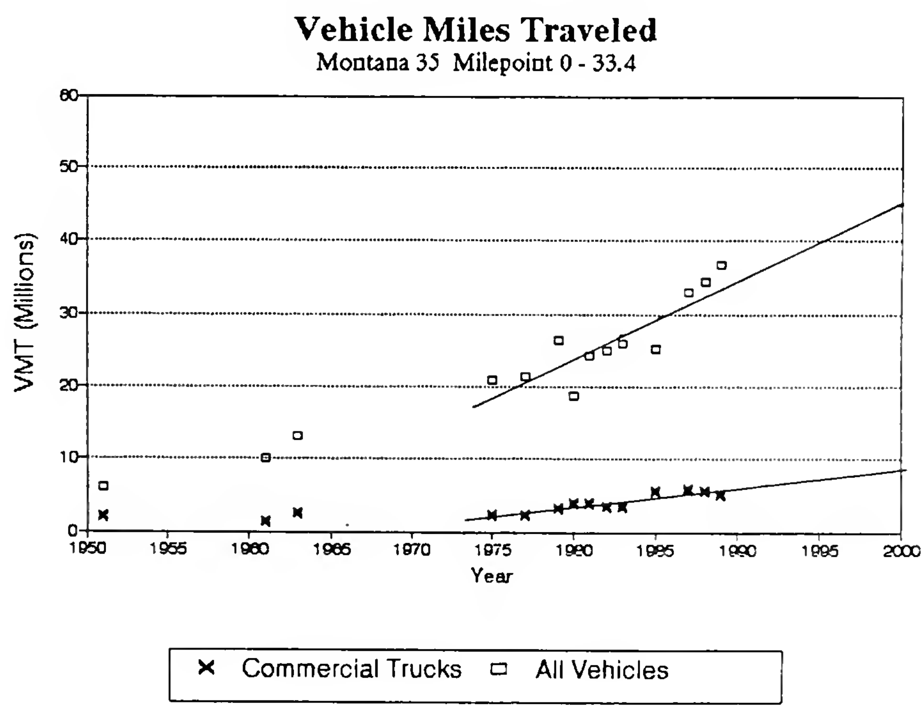
indicates larger signs and letters are needed and therefore recommended.

Current information revealed vehicle volume increases of approximately 4 percent per year. The roadside post-mounted delineation appears questionable; about 40 percent are missing, soiled, old or misplaced. It was also noted that some of the supports are only installed 12 to 18 inches into the ground. These should be reviewed and upgraded. The application of post mounted delineators, poorly maintained signs, and sign supports appears to be a matter which deserves further review by state maintenance personnel. Another area of concern relates to the inconsistent application of guardrail delineation.

Mailbox supports along this corridor are in very poor condition and few are crash worthy. However, the Montana Department of Transportation together with the U.S. Postal Service are working to solve this problem. As of this date, it is obvious that the newly passed state law regarding the removal of hazardous mailboxes is not being applied on this roadway. We believe a review of the implementation process should be conducted by the MDOT to determine why mailbox improvements are not being completed.

Other matters of concern relate to current approach permit policies and the level of existing maintenance of the majority of the traffic control devices on MT 35. Further explanation and examples of these concerns occur later in this report.

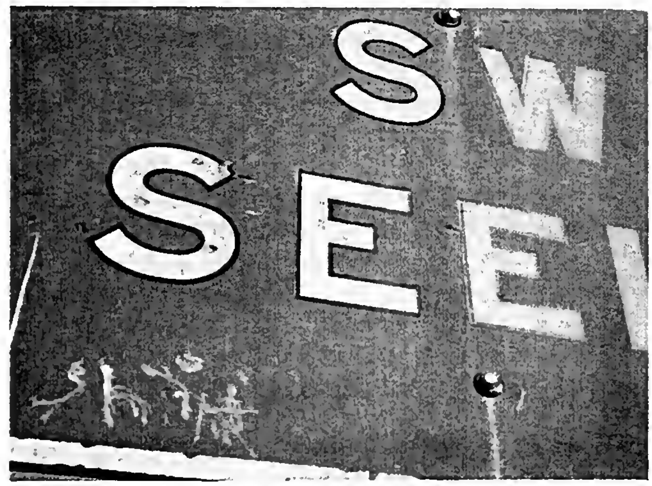
The major focal point of this paper relates to the number of reported traffic accidents in general. However, further concerns directly relate to existing and projected traffic volumes on this corridor. The following graph illustrates the increasing volume and shows why we feel additional emphases should be placed on quickly providing improved traffic control devices along MT 35. It is interesting to note that truck volumes are currently about 13% of the existing traffic on MT 35. This is equal to the existing average percent of trucks on Montana's primary roadway system.



Illustrations and recommendations on specific sites along the corridor follow. These examples of the problems and identification of solutions offer more opportunity for understanding and follow-up by persons best able to complete these improvements. They are not exhaustive of the problems noticed but are indicators of the need to conduct a more thorough inventory and improvement schedule.

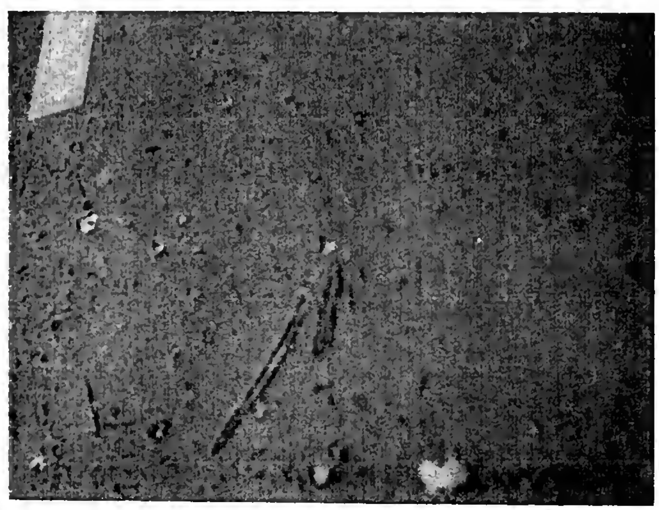
Below Find Examples of Safety Features on MT 35

Some signs are weathered with
poor or no night reflectivity



Weathered sign

Undersized sign

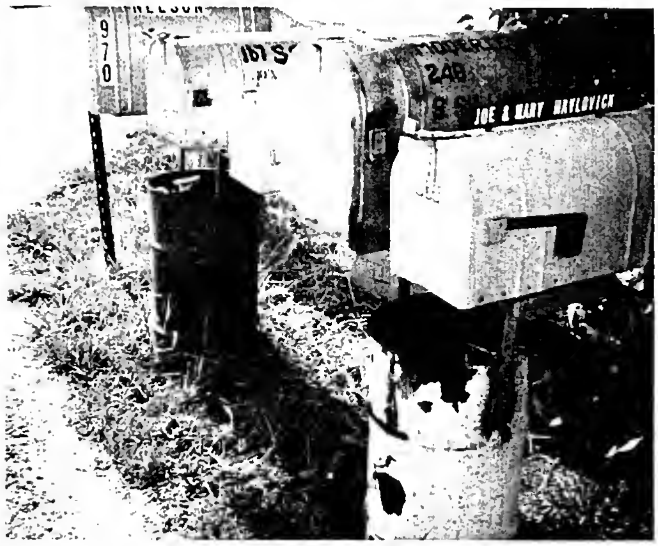


No reflectivity

Incorrect sign base

Incorrect sign support

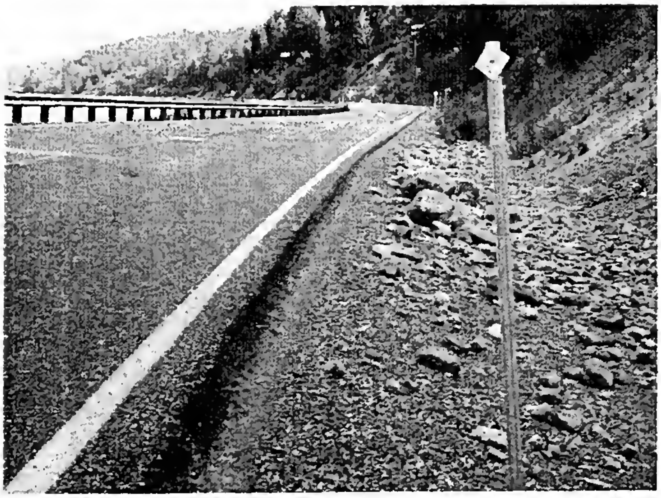
Non-yielding private sign base
in R/W



Non-yielding mailbox support

No delineation
and weed control problems

Non-yielding private sign
support in R/W



Boulders next to travel lane

Fixed object next to travel lane

2. Accident Concentration Areas

The MT 35 corridor accident information revealed eight (8) locations of particular concern. These following locations experienced clustering of traffic collisions from January, 1988 to January, 1992.

a. Approximately 3.5 miles east of Polson at a 10° curve M.P. 3.5 (19 accidents)

b. Flathead RV Park M.P. 4.5 to M.P. 5.1 (9 accidents)

c. Finley Point Area M.P. 6.1 (4 accidents)

d. Three (3) curves M.P. 16.2 (8 accidents)

e. Woods Bay Area M.P. 26.8 to M.P. 27.8 (25 accidents)

f. Big Fork Area, includes the intersection of MT 35 with FAS 209 M.P. 30.8 to M.P. 31.8 (31 accidents)

g. Just north of Big Fork at 10 curve M.P. 32.6 (14 accidents)

h. Intersection of MT 35 with FAP 83 M.P. 33.5 (15 accidents)

A field review of the above locations revealed the following:

a. Approximately 3.5 miles east of Polson at a 10° curve - M.P.3.5

A review of the traffic accidents in this area revealed two (2) trends. The first is 68% of the accidents involve fixed objects

and the second is 68% of the accidents involving southbound drivers. About 70% of the accidents involved a vehicle leaving the roadway. It was also noted that the first chevron alignment sign in the northbound direction is undersized. The advance curve sign supports are either non-breakaway or poorly installed. The northern area of the outside of this curve has numerous trees and brush. Also, the inside of this curve is littered with trees, boulders, and poles.

As a result of the above conditions, we recommend replacing all of the signing for this curve together with new standard sign supports. The advance curve signs should have yellow flashers added to them. Both the inside and outside of the curve should have the fixed objects removed for at least 20 feet and preferably 30 feet from the travelway. Also, the post-mounted delineators should be replaced with flexible delineators. The existing 1 foot paved shoulder should be increased to at least 4 feet on both the inside and outside of this curve.

Since there is a county road approach on the outside of this curve, intersection delineation should also be applied for this condition.

Non-yielding sign support

Roadside hazards

b. <u>Flathead RV Park Area - M.P. 4.5 to M.P. 5.1</u>

After reviewing the accident history and roadway conditions, it appears that recent reconstruction efforts have reduced the accident experience at this location by approximately 75%. Therefore, we do not recommend any traffic control changes at this time. The general revisions as stated previously in this report should adequately improve this area. However, just south of this location are red non-reflective delineators which need to be replaced with white delineators within the next month by highway maintenance personnel.

New approach

Red delineator

c. <u>Finley Point Area - M.P. 6.1</u>

After reviewing the traffic accident history and roadway features for this site, it is concluded that the general roadway recommendations will satisfy most of the problems in this area. However, it was noted that the stop sign for the Finley Point intersection is hidden by brush. Therefore, the brush should be removed so that approaching drivers can see this sign for approximately 750 feet in advance of the intersection. Also, just south of this site, there is a newly constructed approach to a housing sub-division which is poorly constructed. A power substation also exists at this location. The power company has placed substandard guardrail around this structure. This condition should be corrected. A portable advertising sign exists in the highway R/W which should be reviewed since it appears to be permanently placed. As traffic volumes increase in this area, we believe consideration should be given to controlling the access to

the existing grocery store and also an overhead yellow flasher at the Finley Point intersection. This action will probably not be necessary for about 5 to 10 years.

Private sign on R/W

New approach

Power station

Hidden stop sign

d. <u>Three (3) curves at M.P. 16.2</u>

After reviewing both the field and office data, it was determined that the furthest south curve was experiencing most of the accident problem. We believe oversized curve signs should be installed for both directions. The following photos illustrate this curve and roadside slopes:

Curve and roadside cut slope

Roadside fill slope

Problem curve

e. <u>Woods Bay Area M.P. 26.8 to M.P. 27.8</u>

In examining the field and office data regarding this location, we found that the majority of the problem in this area includes the Woods Bay Store, service station, and boat area, together with a reverse curve. The intersection of Yenne Road is central to this location. We believe the traffic accidents associated with the curve can be treated by increasing the size of the advance reverse curve signing and installing a single right curve sign for southbound traffic just north of Yenne Road. Chevron signing for southbound vehicles should be applied for the south curve. This treatment should be supplemented with flexible delineation for both directions of travel. Northbound, the speed limit changes from 35 mph to 45 mph in the middle of the reverse curve. In the southbound direction, the speed limit changes from 45 mph to 35 mph at the same location. It is recommended that consideration be given to extending the 35 mph speed limit beyond the reverse curve towards the north, which will also include the store area. We believe these actions are justified due to both the existing sight distance limitations and traffic accident problems. Within the next 5 to 10 years, as volumes increase, we believe access control should be considered for the Woods Bay Store Area. Based upon existing traffic accident data, we also recommend further winter maintenance activity during snowy and icy road conditions. If the R/W esists and roadside culture is favorable, perhaps a left turn bay for northbound vehicles should be considered.

South curve looking southbound

South curve looking northbound

f. Big Fork Area M.P. 30.8 to M.P. 31.8

This traffic accident concentration area includes three (3) major intersections. These intersections are MT 35 with the north and south approach to Big Fork and FAS 209. Presently all of these intersections have flashing overhead beacons. The north approach to Big Fork is currently being reviewed for future signalization by MDOT. Based upon both vehicle volumes and traffic accidents, it appears that signalization would be appropriate within the next five (5) years at this location. However, there are some geometric problems that need to be addressed before this device is installed. Some of these concerns relate to guardrail placement, sight distance and east-west intersection leg alignment. If these geometric concerns can be appropriately addressed, then the signal should be a benefit to highway safety and traffic operations. The existing guardrail from this intersection to the south intersection to Big Fork is not delineated with standard highway delineators. Therefore, delineation should be added. As a result of this guardrail extending to both the north and south approaches to Big Fork and the narrow pavement width, the rail is creating a sight distance problem for both approaches. We believe an effort to remove as much of the rail as possible is justified. This can be accomplished by improving the roadside culture and flattening slopes.

At the intersection of MT 35 and FAS 209 there are manhole structures two (2) to three (3) feet above the grade at the bottom of the borrow ditches. These structures should be relocated or reinstalled to eliminate these fixed objects next to the travelway. Also, commercial advertising signs are competing in the highway R/W with roadway traffic control signs. We believe that this sign and other commercial signs in the Kalispell area should be removed as required by Montana State Law.

Within the next few years, consideration should be given to controlling the wide open approach on the southeast corner of the intersection of MT 35 and FAS 209.

Manhole structures next to travelway

Manhole structures & culvert next to travelway

Commercial sign in R/W

Sight problem with existing guardrail

g. <u>Curve just north of Big Fork M.P. 32.7</u>

There are some definite traffic accident trends associated with this site. Over 70% of the traffic accidents involve northbound vehicles. About 56% of the northbound accidents are on wet or icy roads. Approximately 80% of the accidents are at night with about 65% resulting in an injury. About 90% of the accidents involve hitting a fixed object. Approximately 60% of the accidents involve a vehicle leaving the inside of the curve.

We believe the following is justified as a result of the above traffic accident statistics and our field review of this site:

1). Install yellow flashing lights on the advance oversized curve signs.
2). Widen the paved shoulders from 1 foot to at least 4 feet.
3). Remove trees, boulders and other fixed objects on the inside of the curve and provide at least a 30 foot roadside recovery area.
4). Upgrade curve chevron and advance signs together with post mounted flexible delineation.
5). Increase winter maintenance activity particularly sanding during snowy and icy road conditions.

Northbound at 10° curve

h. <u>Intersection of MT 35 with MT 83 M.P. 33.4</u>

A review of the traffic accident history revealed the fact that 40% of the collisions are angle type accidents. It was also noted that 53% of the accidents involved an injury. Most of the highway signs are in very poor condition in this area. However, MDOT's proposed signalization of this intersection, together with improved signing and delineation, should help reduce the accident experience at this site.

Intersection of MT 35 with MT 83

In summary, the MT 35 roadway environment is one of several areas that can be improved to enhance the driving performance of senior drivers. Most of the suggested improvements are incremental changes or modifications to existing roadway features or design procedures. Providing signs that are easier to read at greater distance; using multiple signing; properly maintaining existing pavement markings or widening to 6" and signs; using simpler intersection configurations; removing, reducing, or improving conflicting intersection movements are examples of some of the countermeasures which we believe will particularly benefit the senior driver, as well as the entire driving public.

IV. Appendices

Appendix A

Public Information Material, Key Contacts
(See Attachment)

CONTACTS FOR SENIOR TRAFFIC SAFETY PROJECT
ALONG P 5

Governor's Office on Aging -- Brian LaMoure, ph. 444-3111

Susan Kolar Herd -- Missoula area ph. 728-7682

Duane Lipke -- Polson and Bitteroot area ph. 883-6211 x288 or 289

Area Contacts:

1) Mission Valley Senior Center
528 Main St. S.W.
Ronan, MT 59864
Administrator: Jiggs Lentz
Phone: (406) 676-2371

2) Polson Senior Citizens Inc.
504 3rd Ave. E., Box 2243
Polson, MT 59860
Administrator: Clarice McAllister
Phone: (406) 883-4735
(406) 675-8066 After Hours

3) St. Ignatius Senior Citizens Center
P.O. Box 359
St. Ignatius, MT 59865
Administrator: Ruth Krantz
Phone: (406) 745-4462
(406) 745-4472 After Hours

Contacted Reba Fox, Missoula ph. 721-2008 who is the coordinator for AARP 55 Alive courses in the areas surrounding Missoula, which includes our study area. She said they are running more than one course a month in Missoula.

Appendix B

Self-Test Material, Helpful Hints and Handouts
(See Attachment)

DRIVERS 55 PLUS:

TEST YOUR OWN PERFORMANCE

A Self-Rating Form of Questions, Facts and Suggestions for Safe Driving

by

James L. Malfetti, Ed.D.
Darlene J. Winter, Ph.D.

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Montana Highway Traffic Safety Division
303 N. Roberts
Helena, MT 59620
(406) 444-3412

Safety Research and Education Project
Teachers College, Columbia University
and
AAA Foundation for Traffic Safety
1730 M St. N.W., Suite 401
Washington, D.C. 20036

Appendix C

Diagrams and Graphs Regarding Traffic Accidents, Traffic Volumes and Aging Drivers

NPA Data Service Inc. and U.S. Bureau of Census
Percent Population Age 60 and Over

	USA	MONTANA	LAKE COUNTY	RONAN CITY	POLSON CITY	ARLEE CITY	ST. IGNATIUS
1900	6.4	4.2	N/A	N/A	N/A	N/A	N/A
1970	14.1	14.0	18.7	N/A	N/A	N/A	N/A
1980	15.7	15.2	18.8	26.5	26.2	N/A	15.6
1990	16.8	17.6	20%	26%	26%	14%	23%

State Highway Accident Information System

1990 Accident Clusters

		Length In Miles	Total Acc.		Acc./Mile	
P7	27.0 - 90.1 (46.5 - 49.5)	60.0	166		2.77	Darby-Missoula
P1	110 - 171 (119.6 - 124.7)	55.9	141		2.52	Kalispell-E&W
P5	0 - 59.3	59.3	139		2.34	Missoula-Polson
P7	49.5 - 90.1	40.6	138	*	3.40	Hamilton-Missoula
P52	0 - 51.1	51.1	119		2.32	Polson-Big Fork
P1	124.7 - 170.7	46.0	112	*	2.43	Kalispell E
P50	32.8 - 87.0	54.3	98		1.80	Big Sky S-Belgrade
P7	1.4 - 61.4 (46.5 - 49.5)	57.0	83	*	1.46	Idaho-Victor
P1	1.5 - 61.5 (31.8 - 32.7)	59.1	82		1.39	Idaho-Libby E
P5	114.9 - 153.5 (126.4 - 128.9)	36.2	77		2.13	Kalispell S-Whitefish N
P5	62.2 - 109.6	47.4	69		1.46	Polson-Somers S
P8	21.2 - 87.8 (39.8 - 46.6)	60	68		1.13	Elliston-Townsend
P1	59.6 - 119.6	60	63		1.05	Libby E-Kalispell
P5	114.9 - 126.4	11.5	57	*	4.96	Kalispell-Whitefish
P8	46.4 - 87.8	41.4	49	*	1.18	Helena-Townsend
P11	0 - 51.8	51.8	42		0.81	West Yellowstone-Livingston

( ) Urban Area Exclusions
 * Portions of other Areas

State Highway Accident Information System
Age 60 Years and Older
(1986-1989)

	Milepoints	Length In Miles	Accidents	Accident/Mile	
P7	25.8 - 85.5	59.7	144	2.41	Darby-Missoula
P5	0 - 59.3	59.3	139	2.34	I90-Polson
P50	32.8 - 87.0	54.3	99	1.82	S of Big Sky-Bozeman
P5	62.2 - 110.7	48.5	70	1.44	Polson-Kalispell
P1	1.5 - 61.2	59.7	82	1.37	State Line-E of Libby

STATUS REPORT

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

Vol. 27, No. 11 September 5, 1992

Crash Problem on A Per Mile Basis

Comparing motor vehicle crash experience among various groups of people requires not only the number of people in the crashes but also a measure of each group's "exposure" to risk in order to compute crash, death, and injury rates.

One measure of exposure that's widely used in public health is simply the number of people in a group, a measure that produces per-capita rates that are useful in assessing the extent of the motor vehicle crash problem in various groups. Per-capita rates are also useful in comparing the relative contributions of various groups of people to the overall crash problem. Another approach involves

SPECIAL ISSUE: CRASHES, FATAL CRASHES PER MILE

OVERVIEW

Licensing Rates and Annual Miles Driven, By Age and Gender, 1990

MALES

Age	Percent Licensed	Average Miles
16-19	69	8,394
20-29	92	13,515
30-39	96	14,833
40-49	97	14,920
50-59	96	12,435
60-69	95	8,842
70-74	91	6,203
75+	81	4,231
ALL	92	12,508

FEMALES

Age	Percent Licensed	Average Miles
16-19	69	5,838
20-29	89	8,648
30-39	93	8,924
40-49	93	7,894
50-59	87	6,273
60-69	79	3,794
70-74	74	3,037
75+	50	1,811
ALL	85	7,116

BOTH

Age	Percent Licensed	Average Miles
16-19	69	7,079
20-29	91	11,034
30-39	94	11,808
40-49	95	11,400
50-59	91	9,387
60-69	86	6,308
70-74	81	4,535
75+	63	3,055
ALL	88	9,771

using the number of licensed drivers in a group instead of the total number of people in the group. Among most people of driving age in the United States, however, such high proportions have licenses to drive that rates per capita and rates per licensed driver tend to be about the same.

A third way to study motor vehicle crash deaths and injuries is according to the number of miles that are driven. While up-to-date population and licensing data are relatively easy to come by, information about how much people travel isn't routinely available. It requires a special survey and is currently published on a national basis only about every seven years.

The latest information about the amount and type of passenger vehicle travel in the United States has recently been released. Published by the U.S. Department of Transportation, results of the 1990 Nationwide Personal Transportation Survey allow for new comparisons of passenger vehicle crashes and crash deaths and injuries by age, gender, and other factors based on the reported number of miles driven by various groups of people.

The Transportation Department's new survey reports that passenger vehicle drivers in the United States drove an annual average of 9,771 miles (12,508 miles by male drivers compared with 7,116 for females) during 1990. Annual travel was between 11,000 and 12,000 miles for drivers 25-44 years old and was by far the lowest among drivers 75 years and older (3,055 miles) during 1990.

Information on miles driven provides a good measure of exposure but does *not* necessarily supply researchers with a better basis for studying the crash problem than population or licensure data. "None of these measures of exposure provides a 'better' or more accurate way to compare groups of drivers than another one," explains Allan F. Williams, the Institute's senior vice president for research. "Each kind of comparison is useful."

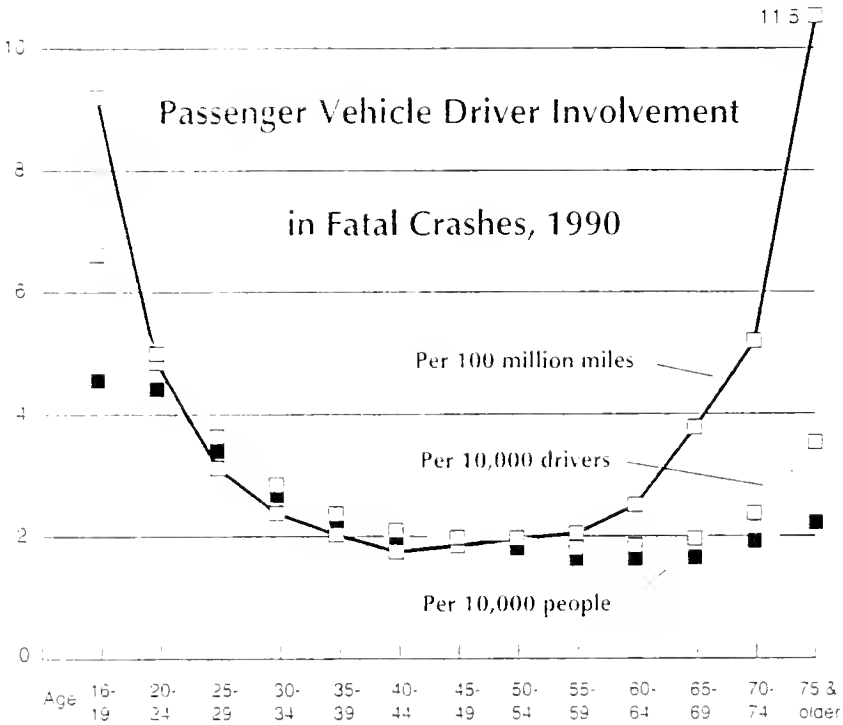
For example, on a per-mile basis elderly drivers have a high risk of fatal crashes, one that's comparable to that of teenagers. But per capita or per licensed driver, fatal crash rates for elderly drivers are low, and their contribution to the overall problem of fatal motor vehicle crashes is relatively small. "Per-mile rates provide useful estimates of crash risk *when people drive*," Williams notes, "but they're not good measures of risk when assessing the extent of the crash problem or the overall contribution of a particular group of people to this problem."

It's also important to recognize that all miles driven don't involve the same degree of risk. Mileage that's accumulated in congested urban traffic, for example, usually means high overall crash risk but very low risk of a *fatal* crash. On the other hand, two-lane rural travel means much higher fatal crash risk than on either congested city streets or rural interstate highways.

Such factors can skew mileage-based comparisons among tractor-trailers and passenger cars, for example, because big truck rigs accumulate so many more of their miles on rural interstate highways while cars, by comparison, roll up more of their miles on urban streets and roads.

"To get the most complete picture," Williams explains, "it's best to look at crash rates and fatal crash rates not only per mile but also per capita and per licensed driver. Each tells a somewhat different story."

This special issue of *Status Report* focuses on passenger vehicle driver involvement in fatal and nonfatal crashes per mile driven during 1990. For comparison purposes, the researchers also calculated driver crash involvement per capita and per licensed driver.

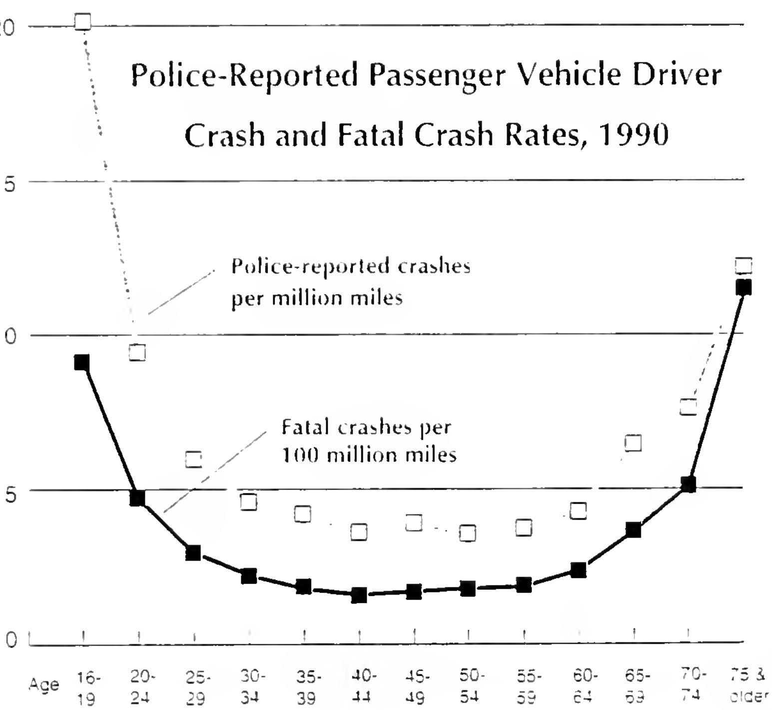


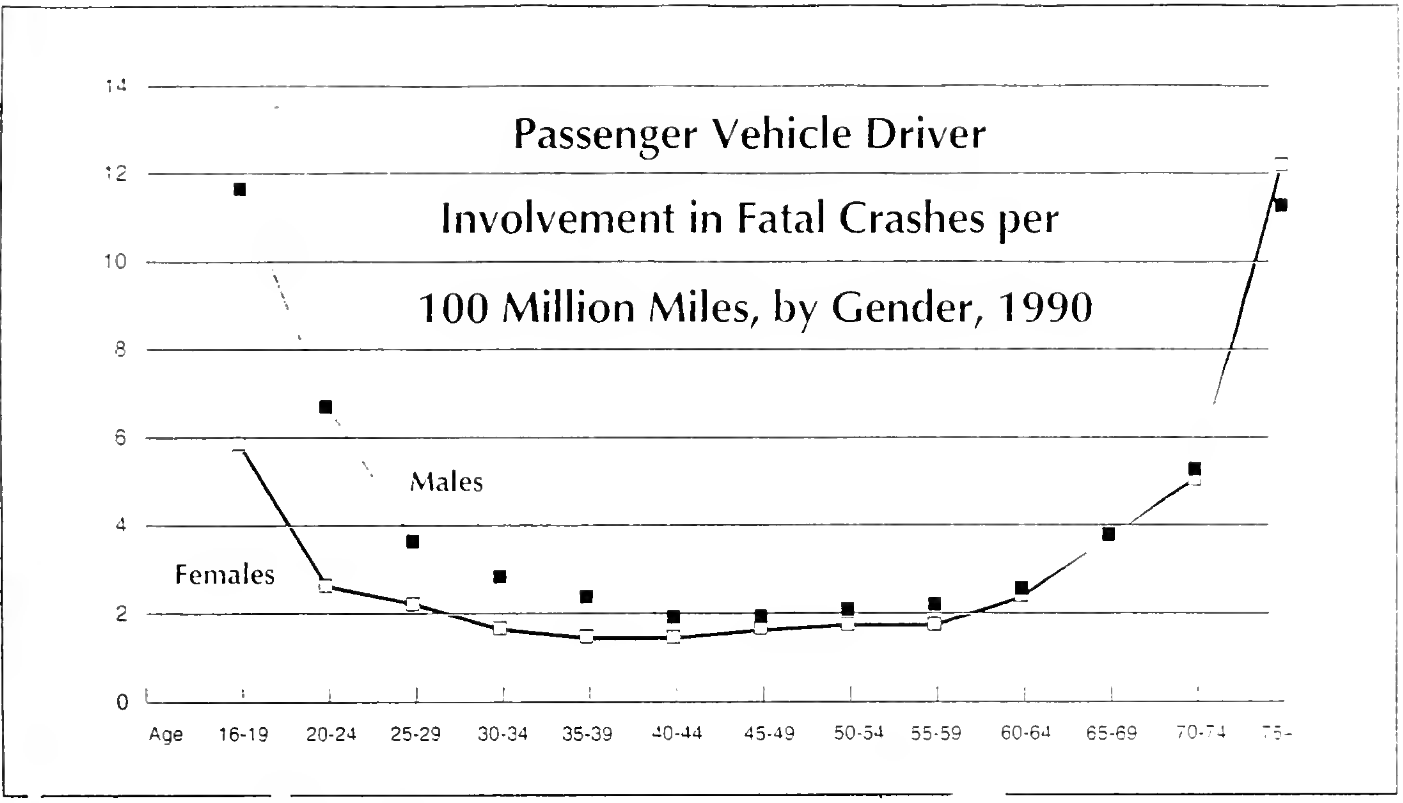
"To get the most complete picture, it's best to look at crash rates and fatal crash rates not only per mile but also per capita and per licensed driver. Each [of these measures] tells a somewhat different story."

Age Comparisons: The youngest drivers on U.S. roads had the highest numbers of police-reported passenger vehicle crashes per million miles traveled in 1990. Sixteen year olds had the very highest rate — 43 per million miles or more than 10 times as high as the rate for people 35-59 years old.

Among all age groups, drivers 75 years and older had the highest number of *fatal* crashes per 100 million miles traveled in 1990. People 16-19 years old had the second highest per-mile rate of fatal crashes.

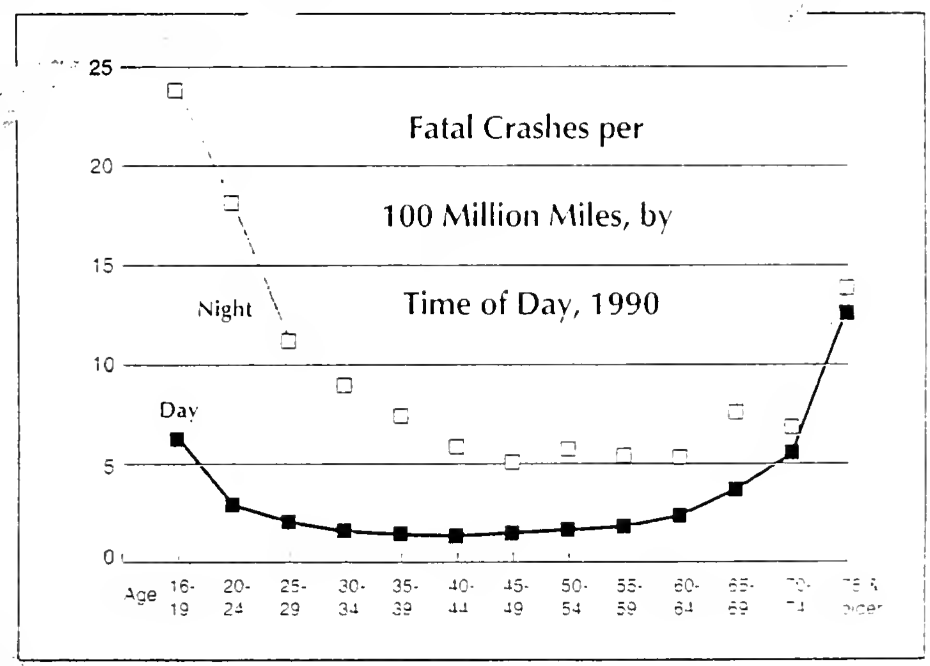
These age patterns change when crash and fatal crash rates are measured according to something other than miles traveled. Per capita, for example, there's only a slight upturn in fatal crash involvement rates for elderly drivers. Their per-capita involvement in fatal crashes is, in fact, among the lowest. Elderly people's per-capita involvement in police-reported crashes and

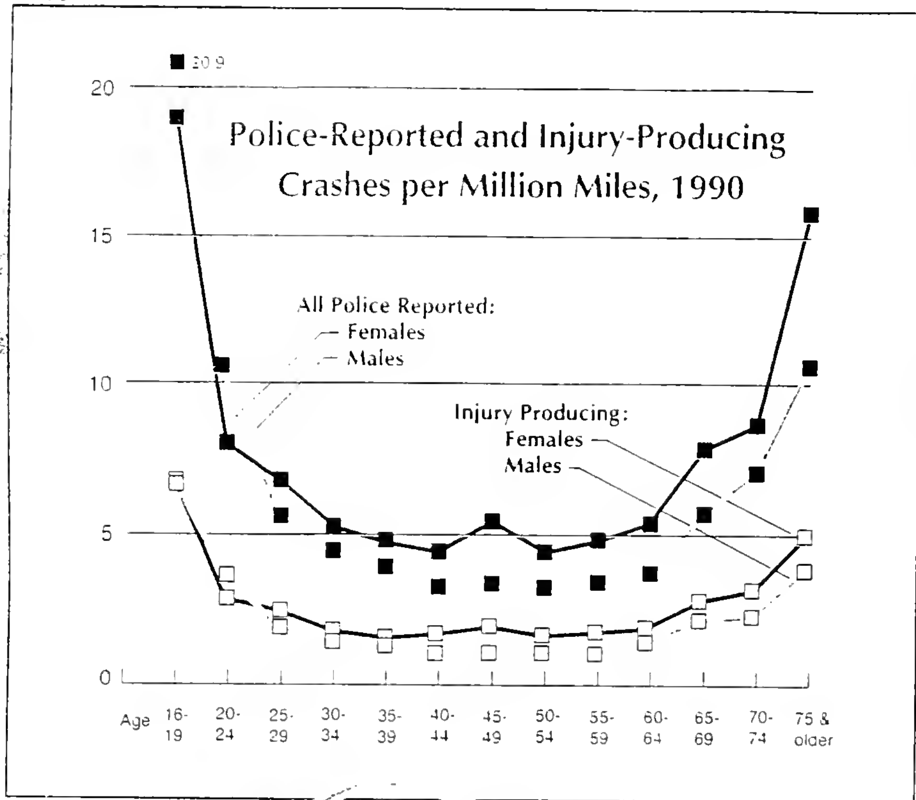




injury-producing crashes is the lowest of any age group. This is because fewer older people are licensed to drive, and they drive fewer miles per license holder, than younger groups. When they do drive, elderly people are associated with high rates of fatal crashes, but this problem is mitigated by how little they drive.

Gender Comparisons: Men have higher per-mile rates of *fatal* crash involvement than women — 3.5 versus 2.2 per 100 million miles. The widest gender differences occur at the youngest driving ages (16-24 years old), and the gap between men and women closes at age 40 and older. When it comes to all police-reported crashes (not just the fatal ones), women 25 years and older have somewhat higher rates per million miles than men do. In crashes involving injuries, women of most ages also have slightly higher per-mile rates, compared with men. "The combination of higher fatal crash rates for men and higher





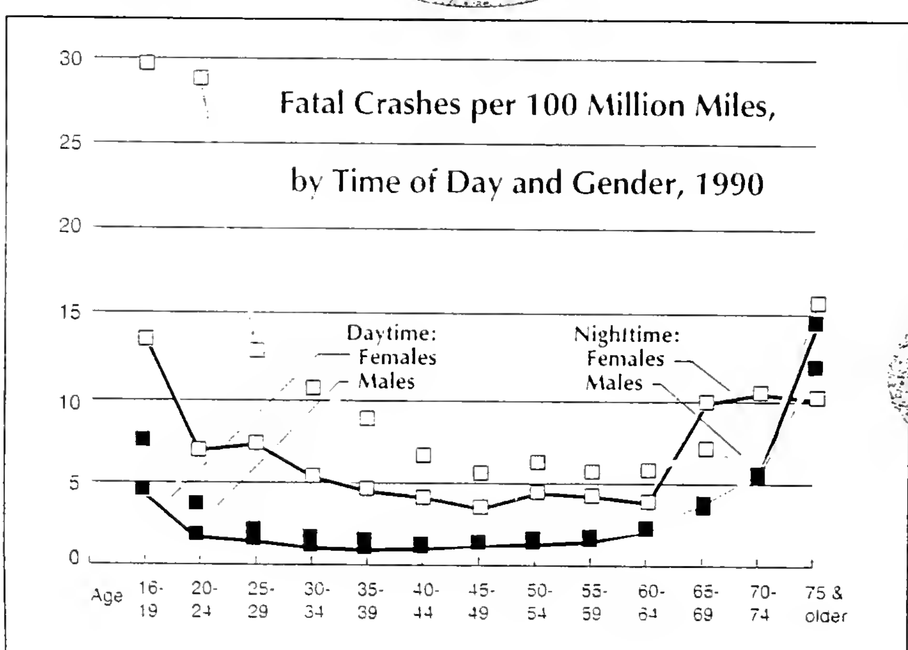
overall crash rates for women may result from a number of factors," says Ken Campbell of the University of Michigan's Transportation Research Institute. "One important factor is that, on average, men are in more severe crashes than women."

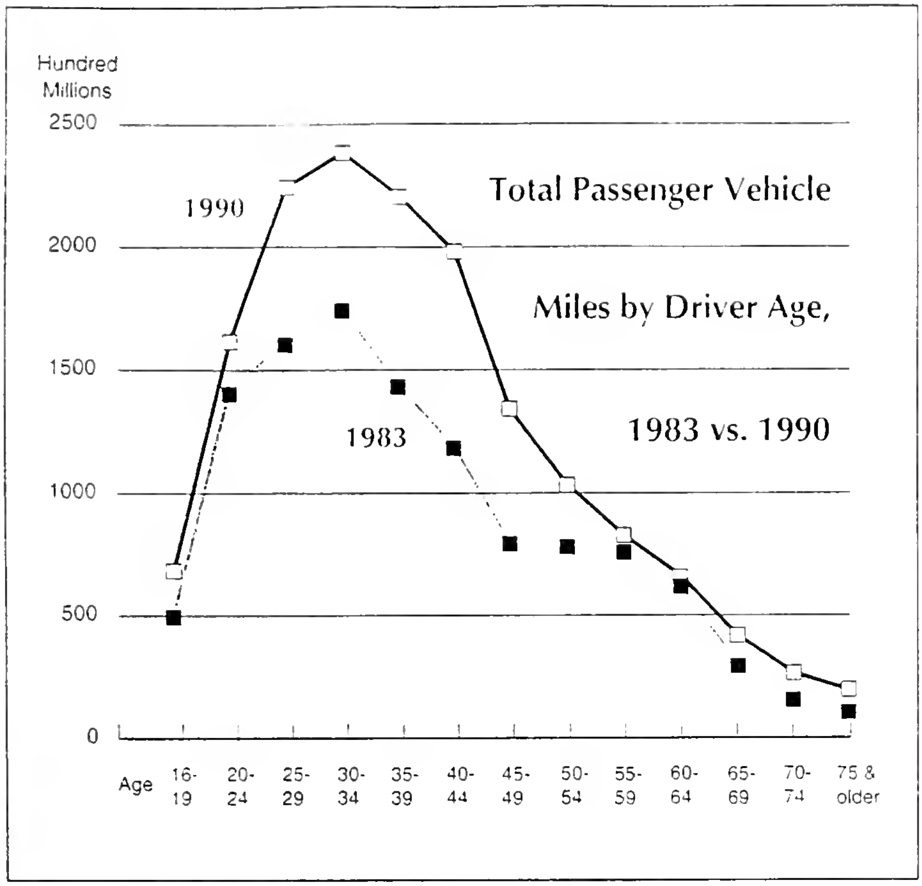
Time of Day: Nighttime (9 p.m. to 6 a.m.) fatal crash rates are much higher than daytime rates. In fact, they're almost five times higher. Nighttime fatal crash rates are also much higher for young drivers, particularly young male drivers, than for older drivers. Males 16-19 years old have the highest rates of nighttime fatal crash involvement, followed closely by 20-24-year-old males. The nighttime rate for 16-19 year olds is four times their daytime rate.

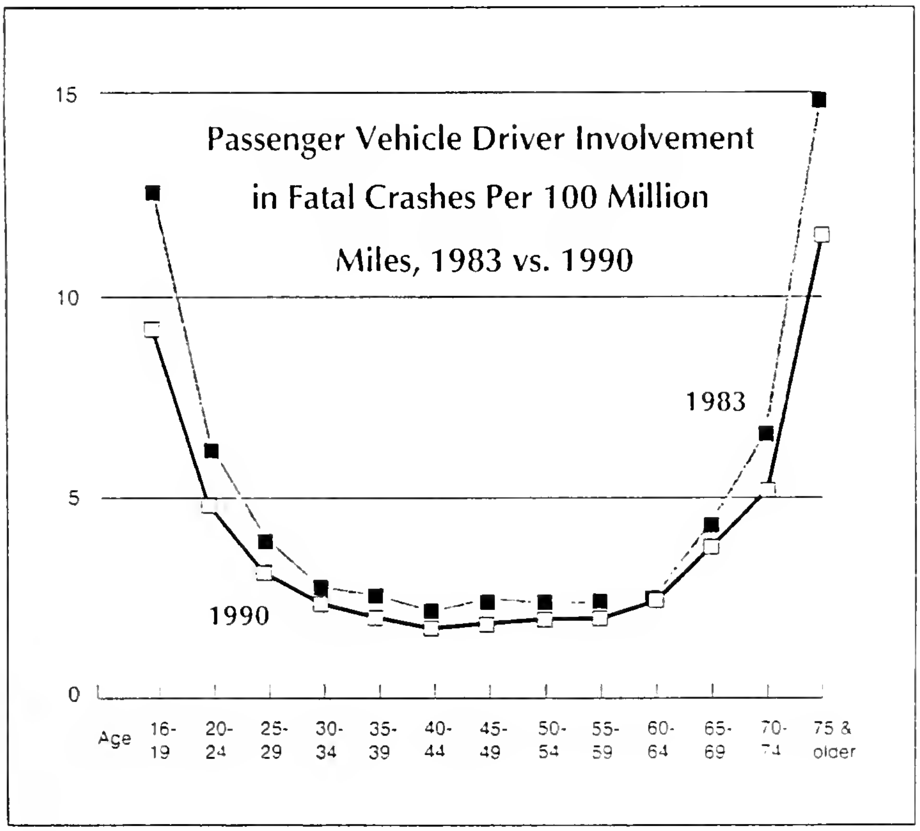
These higher nighttime fatal crash rates for teenagers prevail even though a number of U.S. jurisdictions have curfews restricting nighttime activities, including driving, by 16 and 17 year olds. These have been found to reduce the crash involvement of restricted drivers (see *Status Report*, Vol. 27, No. 10, Aug. 1, 1992), but curfew laws aren't in effect in enough jurisdictions nationwide to make up for young drivers' high involvement in fatal crashes when they drive at night.

1990 Compared with 1983: Total passenger vehicle driver miles has increased 41 percent since 1983, when the previous Nationwide Personal Transportation Survey was conducted. Total mileage increased 32 percent among men and 60 percent among women. Most of the increase was for people 25-54 years old. Very little increase occurred between 1983 and 1990 among young drivers (16-24 years) and older drivers (55 years and older).

Licensure rates did increase markedly among older drivers between the survey years. However, their share of overall travel increased only slightly.







Driver fatal crash involvement per 100 million miles decreased 21 percent between 1983 and 1990. The rate decreased 18 percent among men and 22 percent among women. Particularly large declines occurred among the youngest drivers (16-24 years) and the oldest ones (70 years and older).

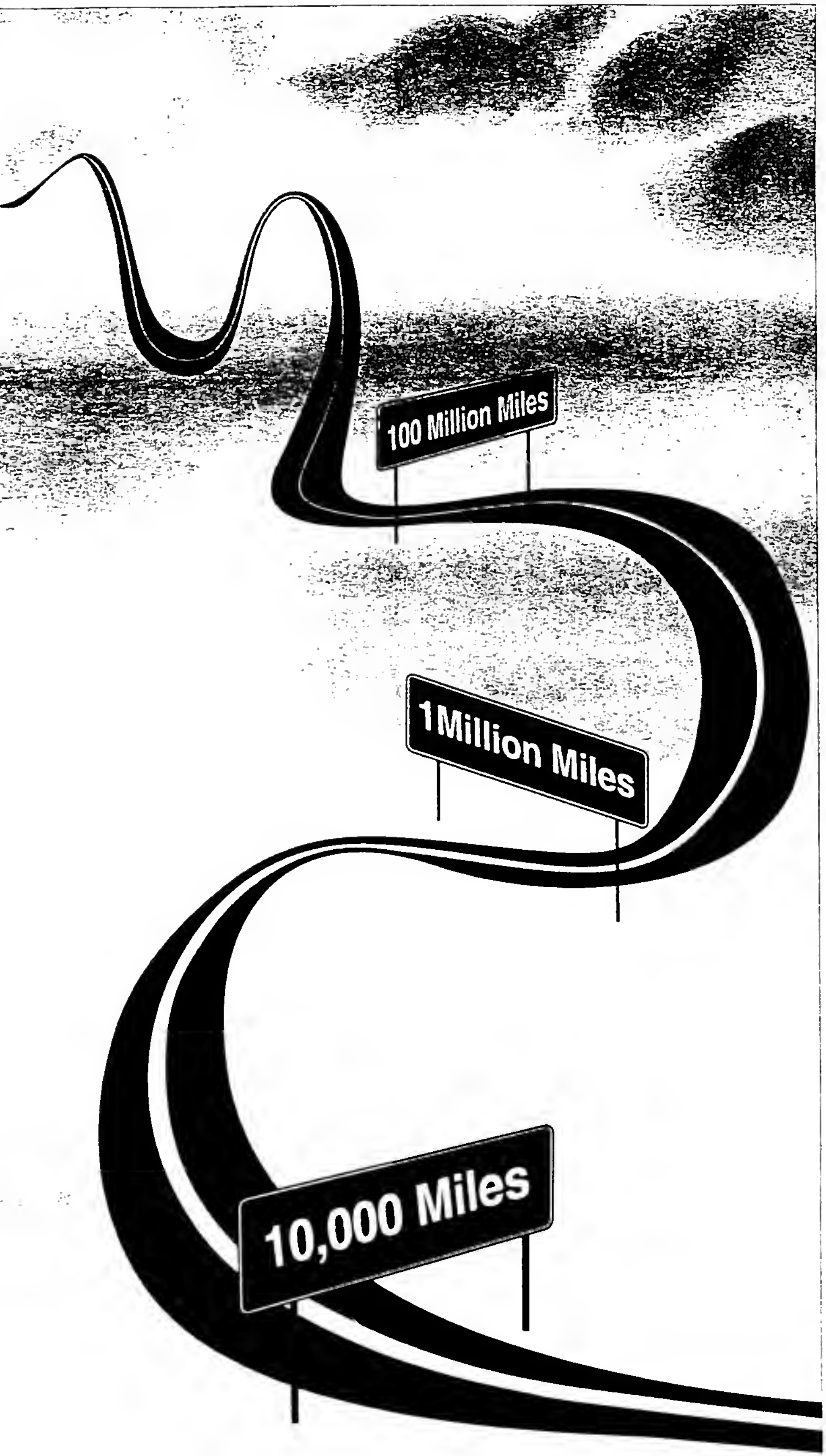
Although the proportion of older people in the U.S. population is growing and will continue to do so, the contribution of older drivers to the crash death problem didn't change substantially during 1983-90. In 1983, for example, people 65 and older comprised 15 percent of the driving-age population and 9 percent of the drivers in fatal crashes. In 1990, they comprised 16 percent of the population and 11 percent of those in fatal crashes.

"Elderly drivers continue to be an underinvolved group per capita," Williams points out. In contrast, drivers 16-24 years old comprised 18 percent of the driving-age population in 1990 and accounted for 30 percent of those in fatal crashes. "Young drivers continue to figure much more prominently in this public health problem," Williams concludes, even though the proportion of all crashes and fatal crashes accounted for by young drivers actually decreased between 1983 and 1990.

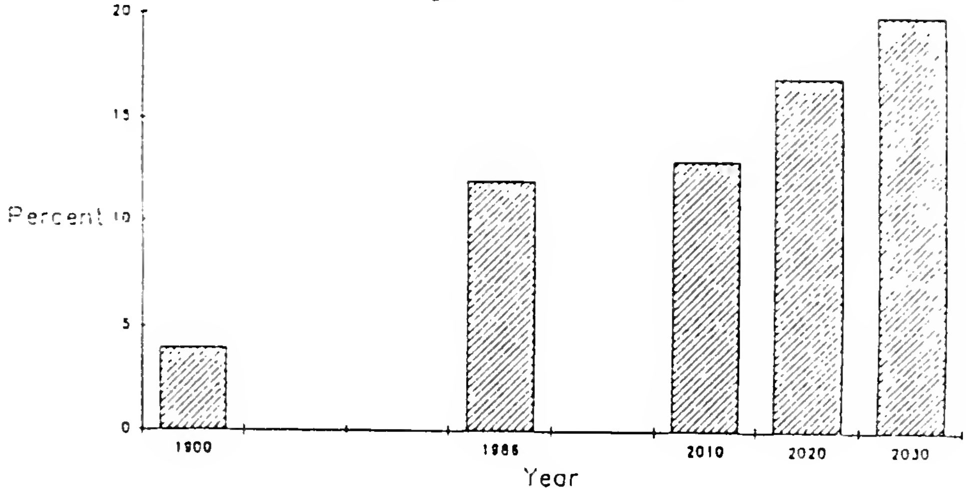
About This Report: The rates shown in this report were calculated by Dawn Massie and Ken Campbell of the University of Michigan Transportation Research Institute together with Insurance Institute for Highway Safety researchers. Rates are based on three Transportation Department sources: the 1990 Nationwide Personal Transportation Survey, for which 22,000 U.S. households supplied information on vehicle ownership, travel amounts and patterns, and driver characteristics; the Fatal Accident Reporting System, a census of fatal crashes on U.S. public roads; and the 1990 General Estimates System, which provides a probability-based estimate of all police-reported crashes in this country.

Age Distributions, 1983 Compared With 1990

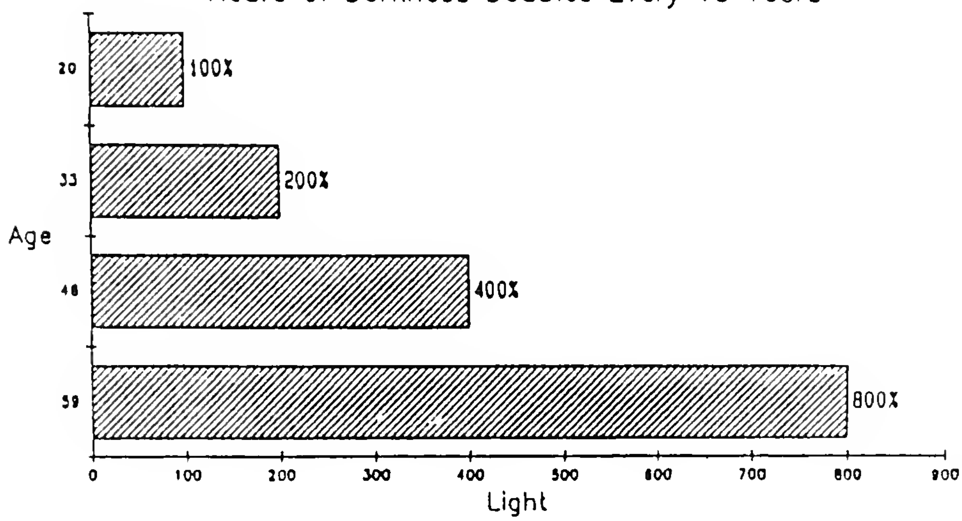
	1983	1990
Percent distribution of driving-age population		
16-24 years	21	18
25-64 years	64	66
65+ years	15	16
Percent distribution of miles driven, by age		
16-24 years	17	15
25-64 years	78	80
65+ years	5	6
Percent distribution of licensed drivers, by age		
16-24 years	19	16
25-64 years	71	72
65+ years	10	13
Percent distribution of police-reported crashes, by age		
16-24 years	34	31
25-64 years	59	61
65+ years	8	8
Percent distribution of fatal crash involvement, by age		
16-24 years	35	30
25-64 years	56	60
65+ years	9	11



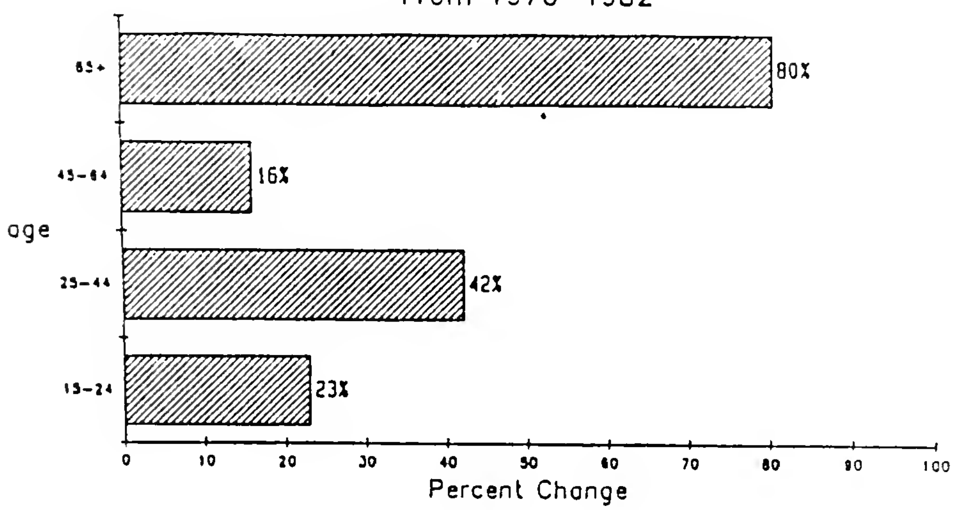
Percent of Total Population
Aged 65 & Over



Amount of Light Required to See During
Hours of Darkness Doubles Every 13 Years



Increase in Driver Population
From 1970–1982



Appendix C

Diagrams and Graphs Regarding Traffic Accidents, Traffic Volumes and Aging Drivers

NPA Data Service Inc. and U.S. Bureau of Census
Percent Population Age 60 and Over

	USA	MONTANA	LAKE COUNTY	RONAN CITY	POLSON CITY	ARLEE CITY	ST. IGNATIUS
1900	6.4	4.2	N/A	N/A	N/A	N/A	N/A
1970	14.1	14.0	18.7	N/A	N/A	N/A	N/A
1980	15.7	15.2	18.8	26.5	26.2	N/A	15.6
1990	16.8	17.6	20%	26%	26%	14%	23%

State Highway Accident Information System

1990 Accident Clusters

		Length In Miles	Total Acc.		Acc./Mile	
P7	27.0 - 90.1 (46.5 - 49.5)	60.0	166		2.77	Darby-Missoula
P1	110 - 171 (119.6 - 124.7)	55.9	141		2.52	Kalispell-E&W
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P1	124.7 - 170.7	46.0	112	*	2.43	Kalispell E
P50	32.8 - 87.0	54.3	98		1.80	Big Sky S-Belgrade
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P1	1.5 - 61.5 (31.8 - 32.7)	59.1	82		1.39	Idaho-Libby E
P5	114.9 - 153.5 (126.4 - 128.9)	36.2	77		2.13	Kalispell S-Whitefish N
P5	62.2 - 109.6	47.4	69		1.46	Polson-Somers S
P8	21.2 - 87.8 (39.8 - 46.6)	60	68		1.13	Elliston-Townsend
P1	59.6 - 119.6	60	63		1.05	Libby E-Kalispell
P5	114.9 - 126.4	11.5	57	*	4.96	Kalispell-Whitefish
P8	46.4 - 87.8	41.4	49	*	1.18	Helena-Townsend
P11	0 - 51.8	51.8	42	*	0.81	West Yellowstone-Livingston

( ) Urban Area Exclusions
* Portions of other Areas

State Highway Accident Information System
Age 60 Years and Older
(1986-1989)

	Milepoints	Length In Miles	Accidents	Accident/Mile	
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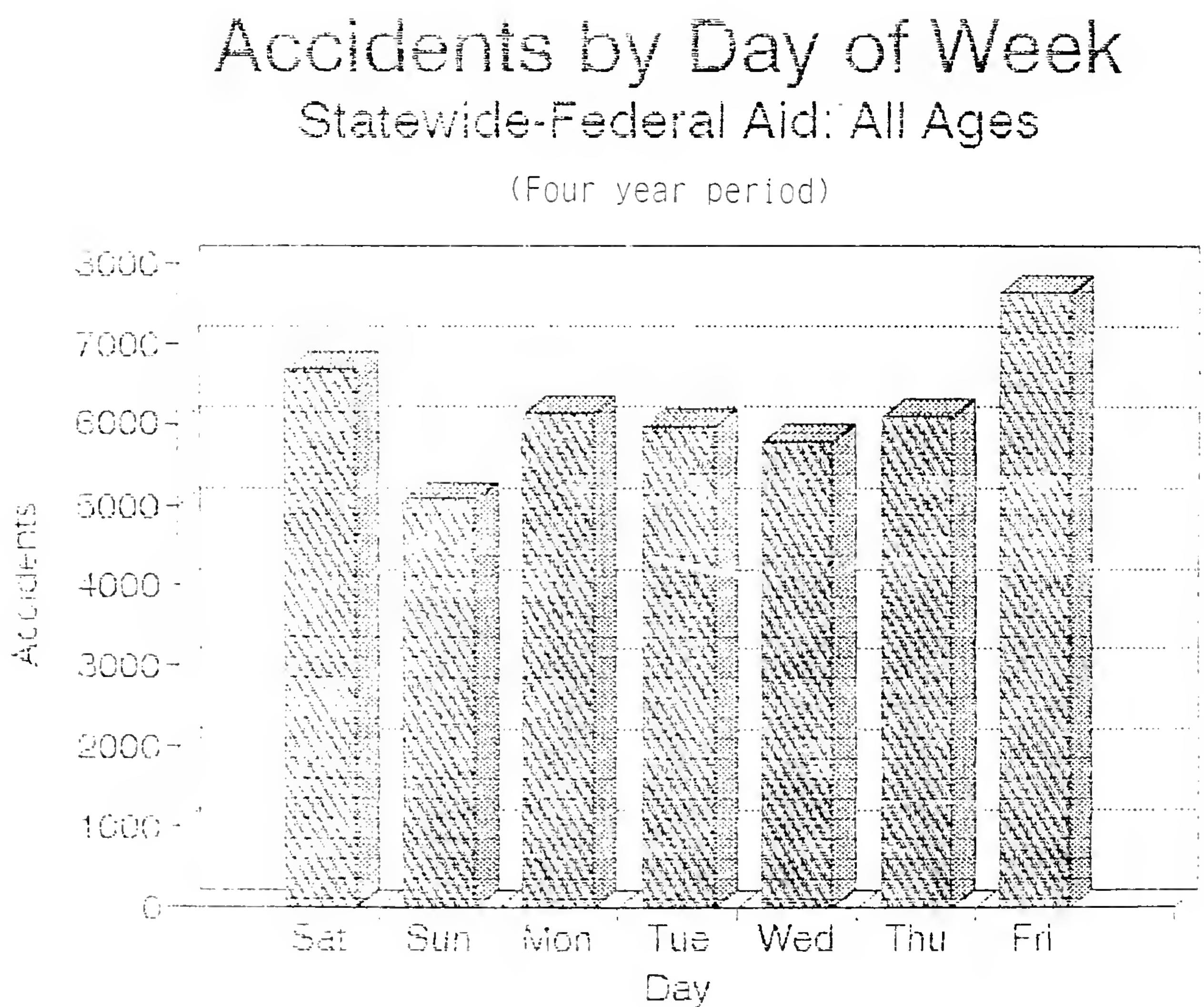
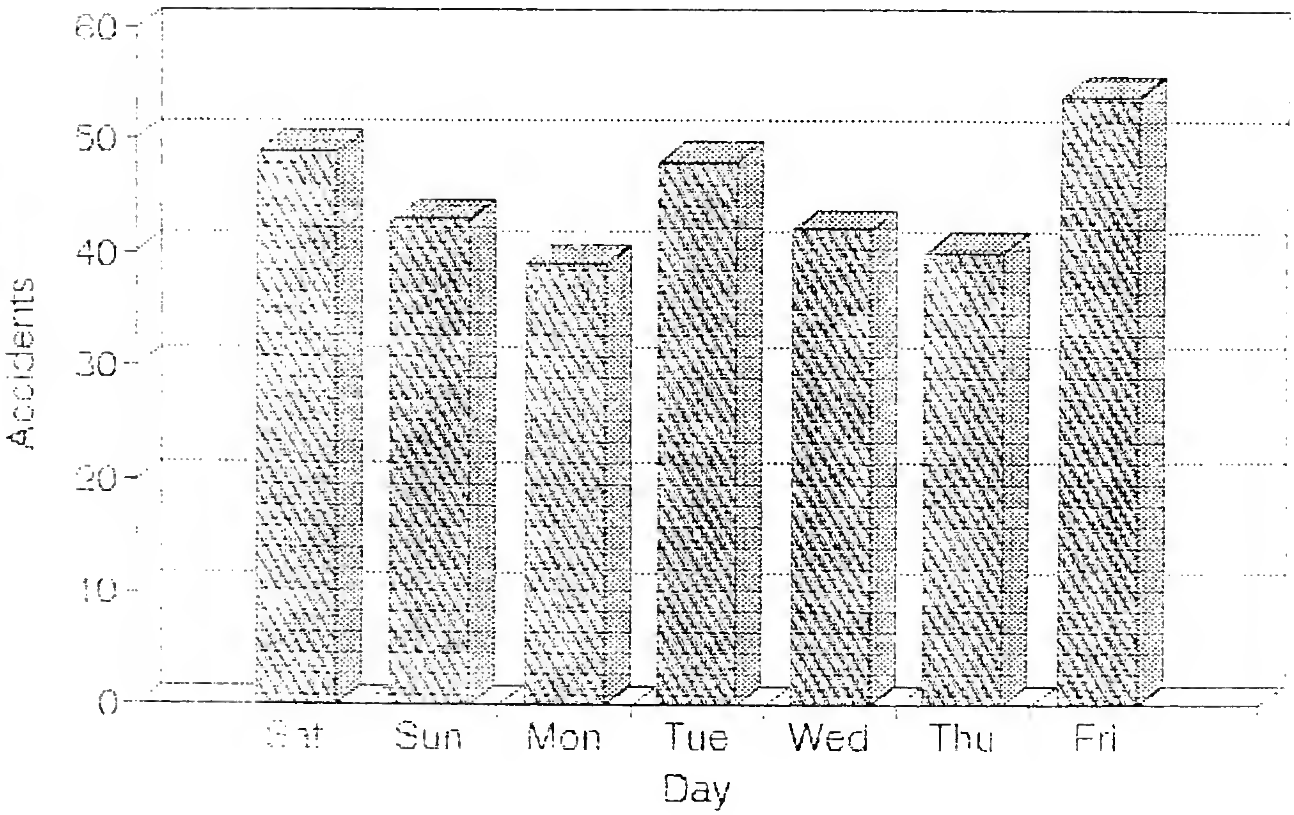
P50	32.8 - 87.0	54.3	99	1.82	S of Big Sky-Bozeman
P5	62.2 - 110.7	48.5	70	1.44	Polson-Kalispell
P1	1.5 - 61.2	59.7	82	1.37	State Line-E of Libby


Accidents by Day of Week
Statewide-Federal Aid: All Ages
(Four year period)
8000
7000
6000
5000
4000
3000
2000
1000
0
Accidents
Sat
Sun
Mon
Tue
Wed
Thu
Fri
Day

Accidents by Day of Week

Study Site: All Ages

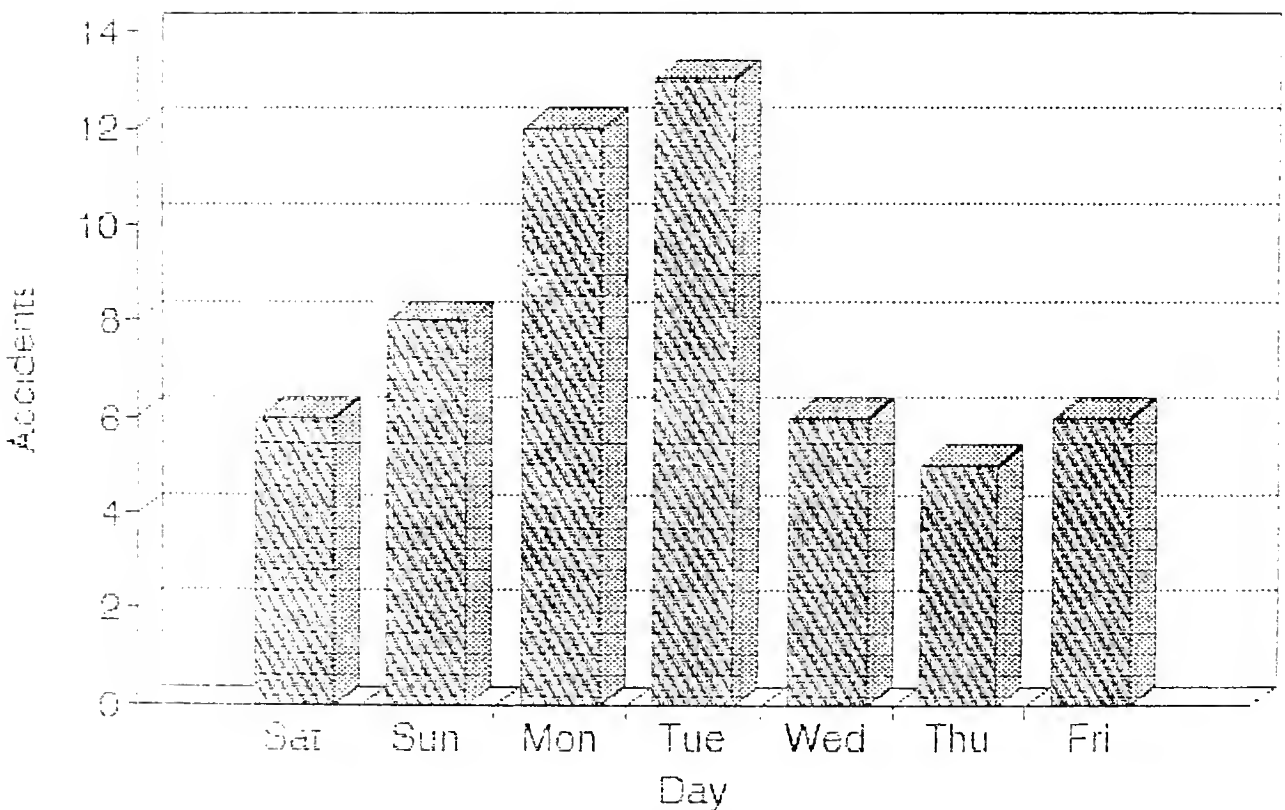
(Four year period)



Accidents by Day of Week

Study Site: 60 and Over

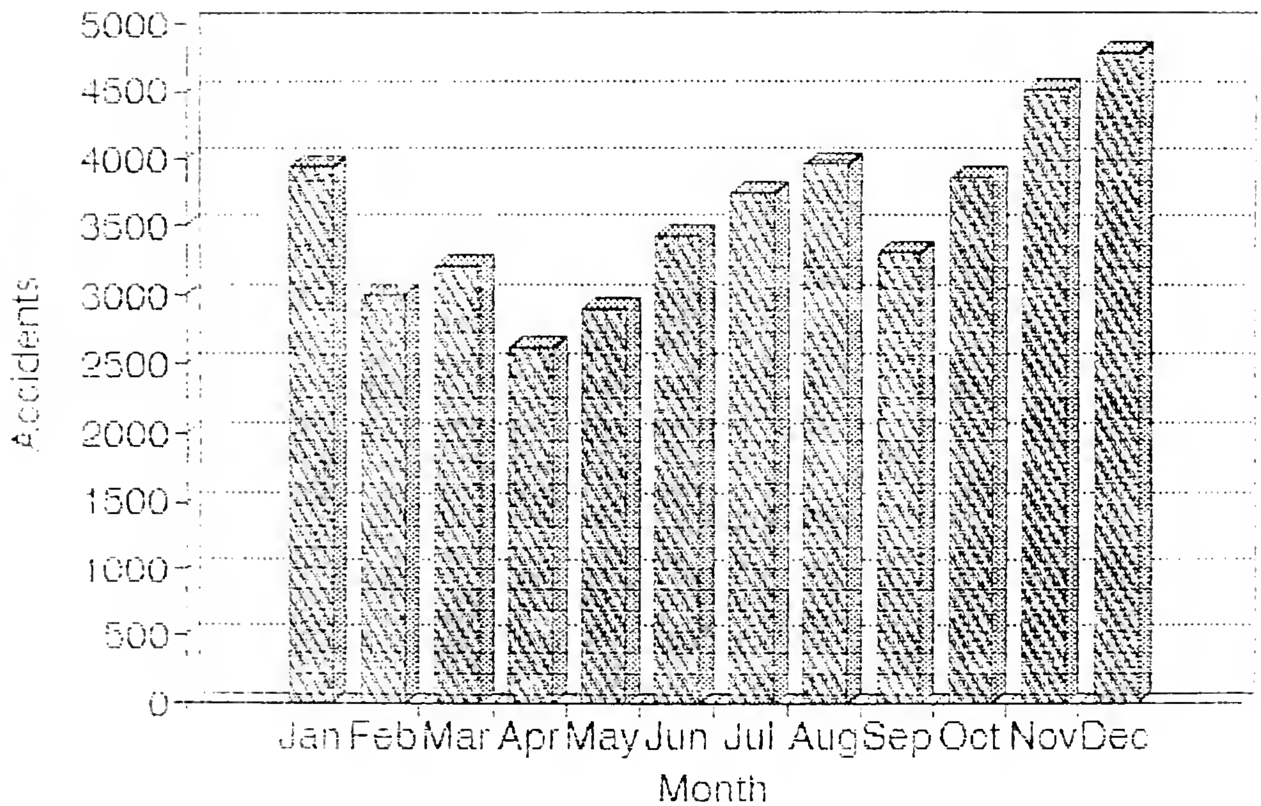
(Four year period)



Accidents by Month

Statewide-Federal Aid: All Ages

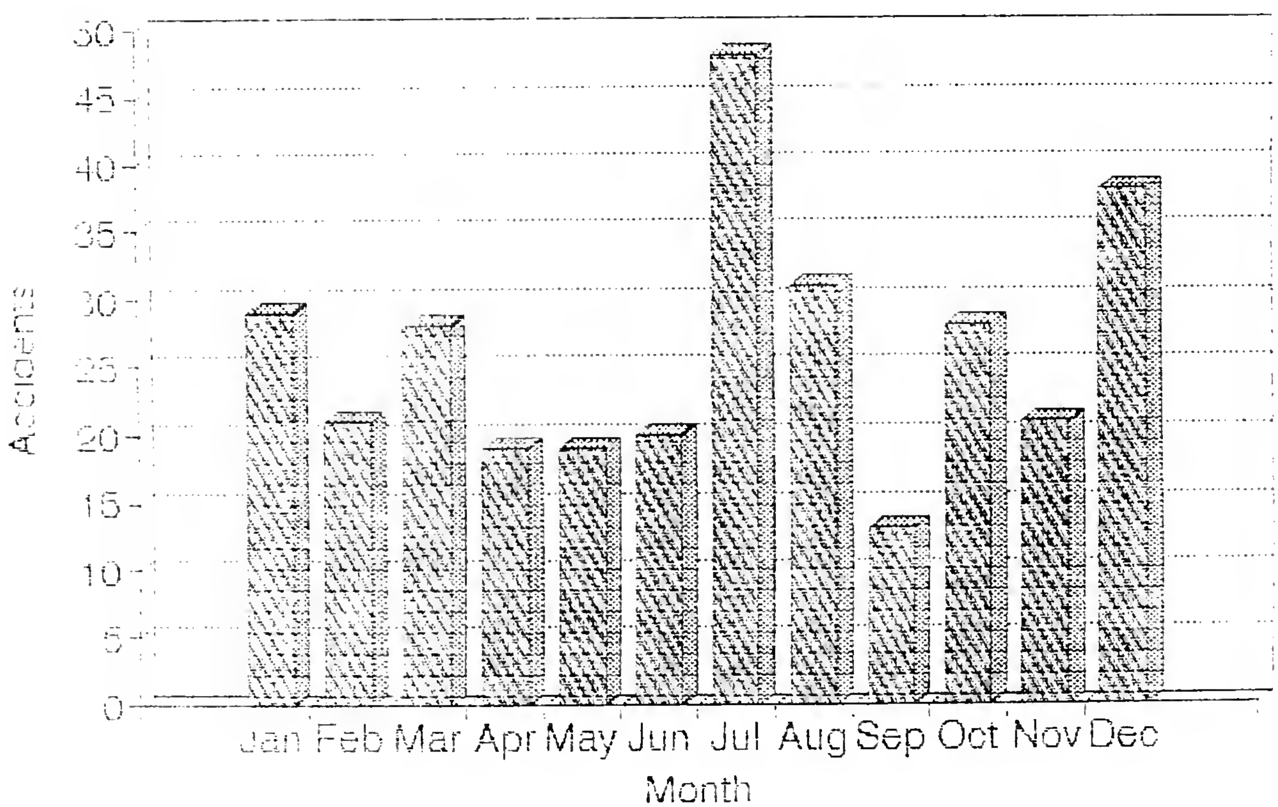
(Four year period)



Accidents by Month

Study Site: All Ages

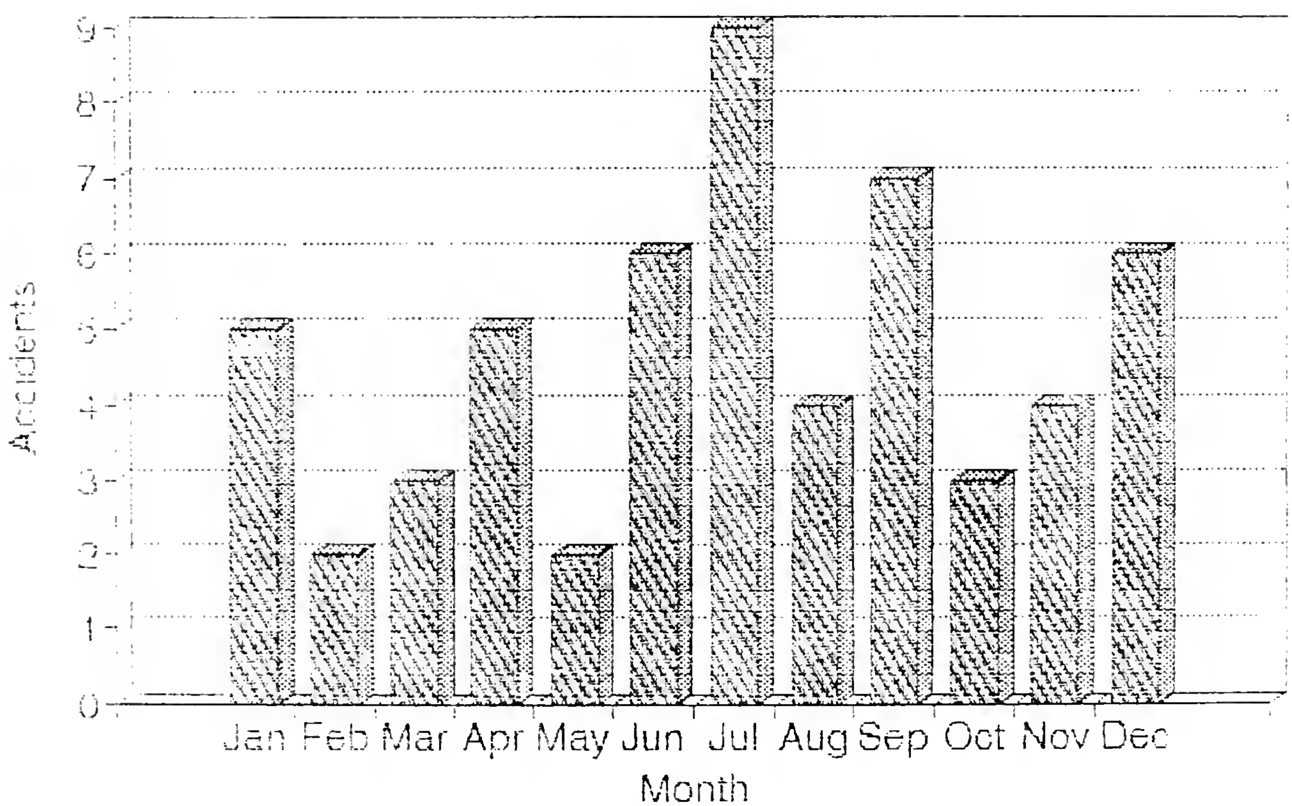
(Four year period)



Accidents by Month

Study Site: 60 and Over

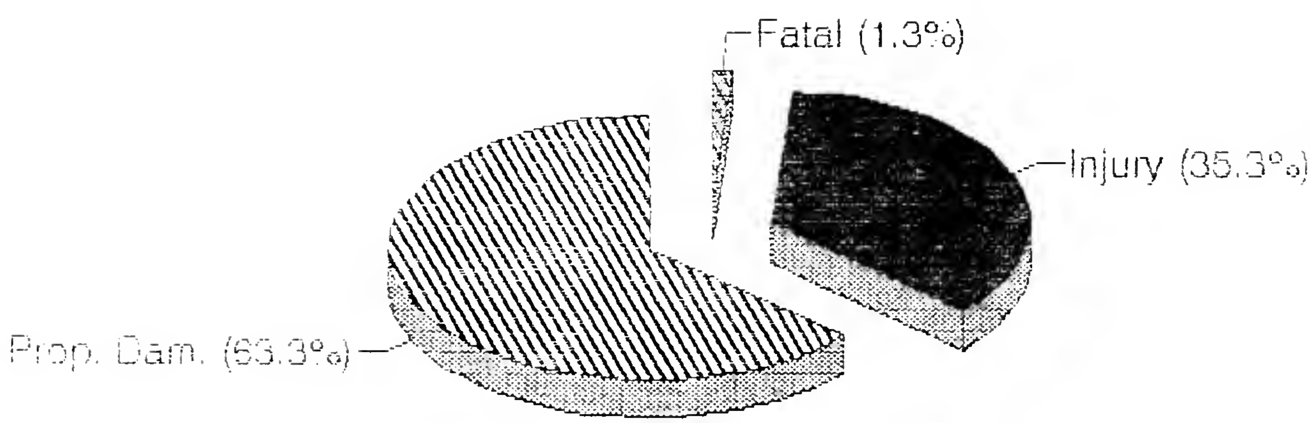
(Four year period)



Accident Severity

Statewide-Federal Aid: All Ages

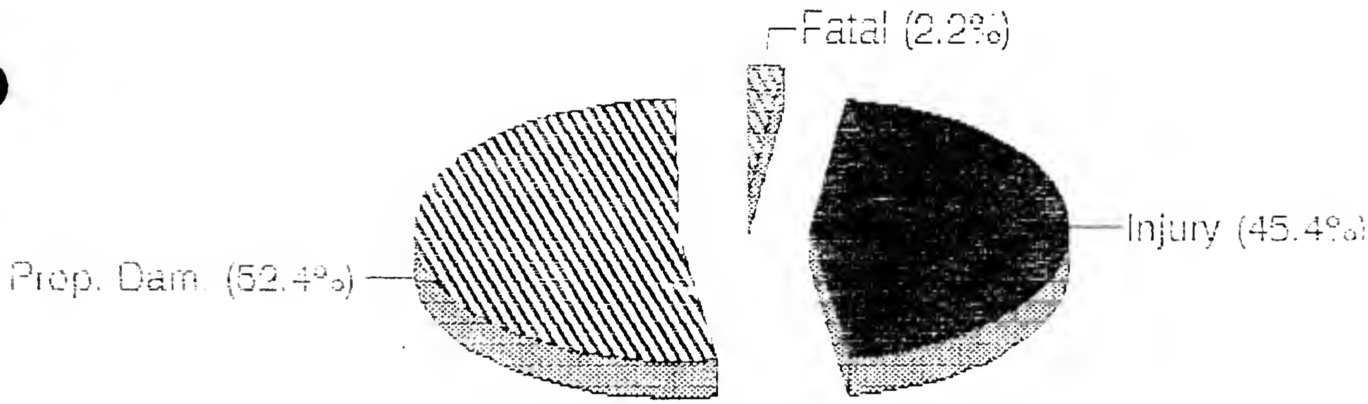
(Four year period)



Accident Severity

Study Site: All Ages

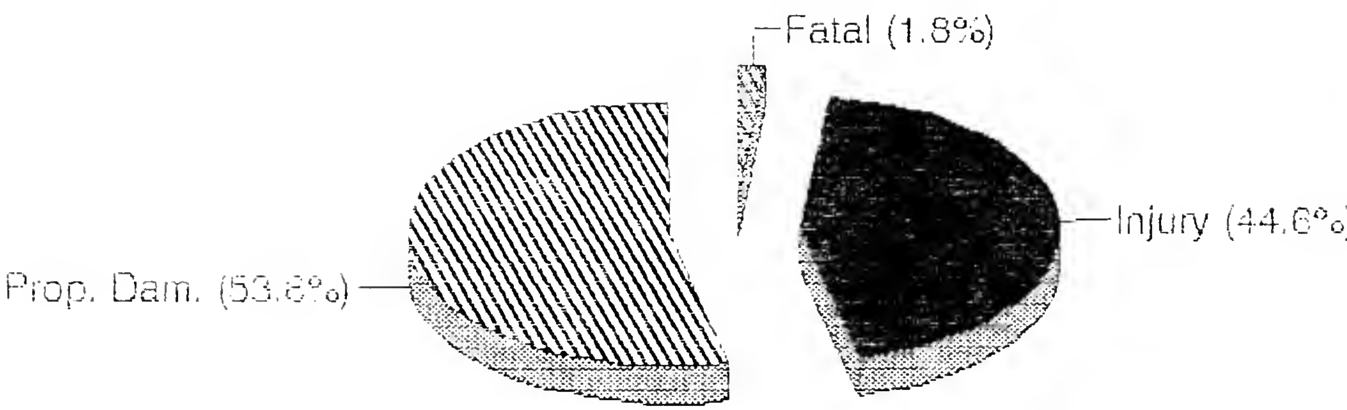
(Four year period)



Accident Severity

Study Site: 60 and Over

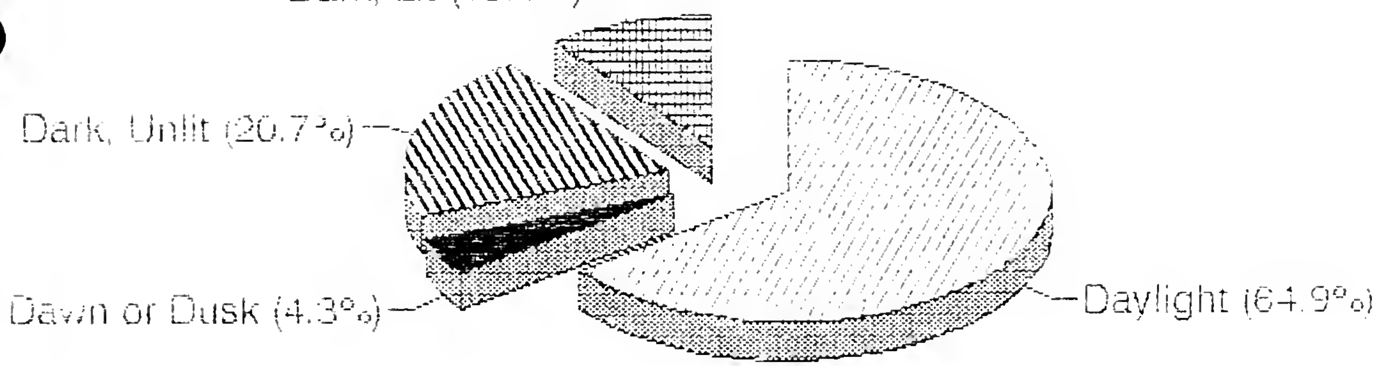
(Four year period)



Accidents by Light Condition

Statewide-Federal Aid: All Ages

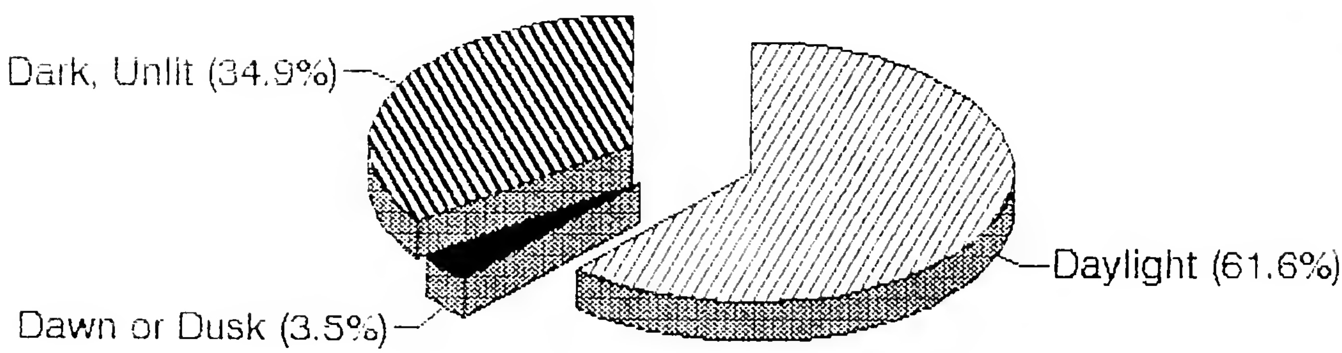
(Four year period)



Accidents by Light Condition

Study Site: All Ages

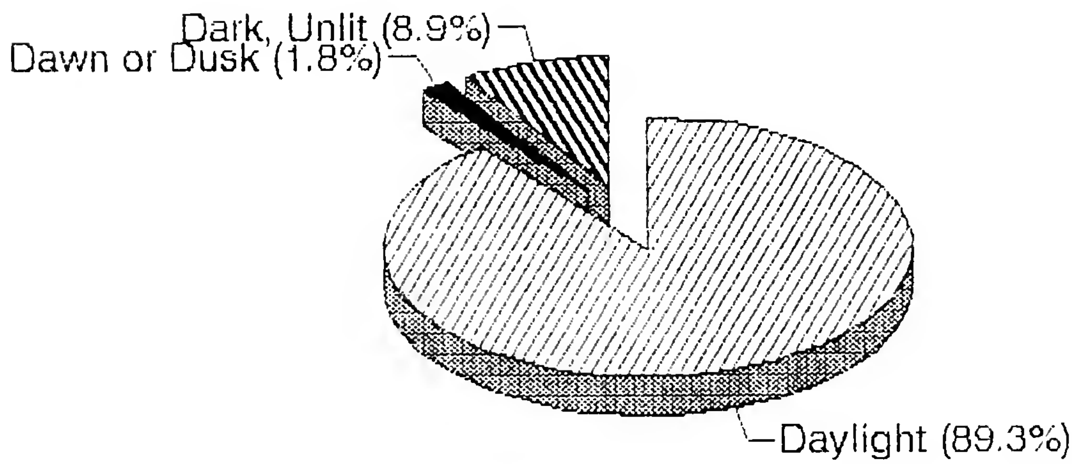
(Four year period)



Accidents by Light Condition

Study Site: 60 and Over

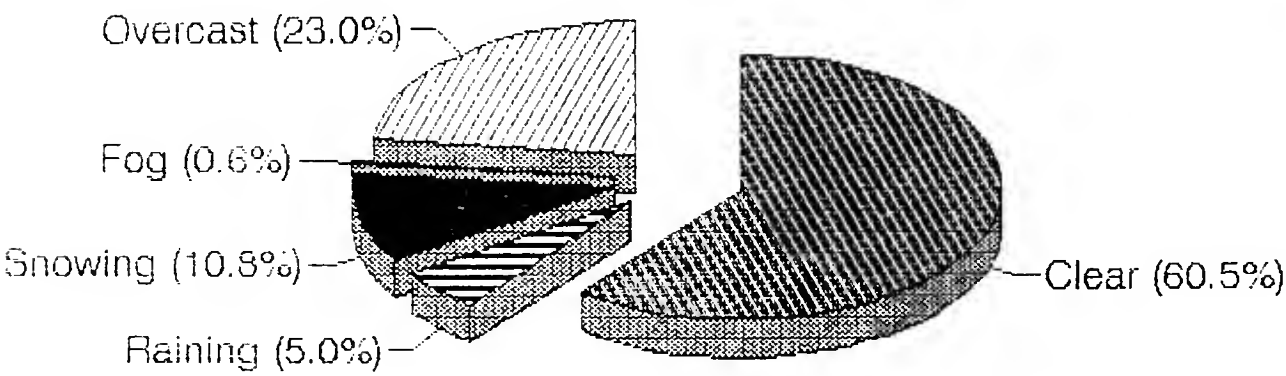
(Four year period)



Accidents by Weather Condition

Statewide-Federal Aid: All Ages

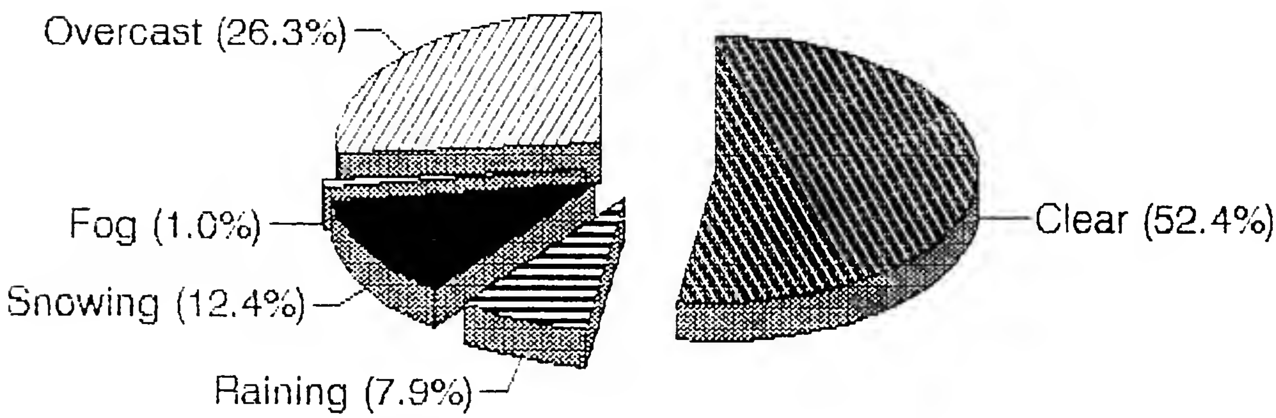
(Four year period)



Accidents by Weather Condition

Study Site: All Ages

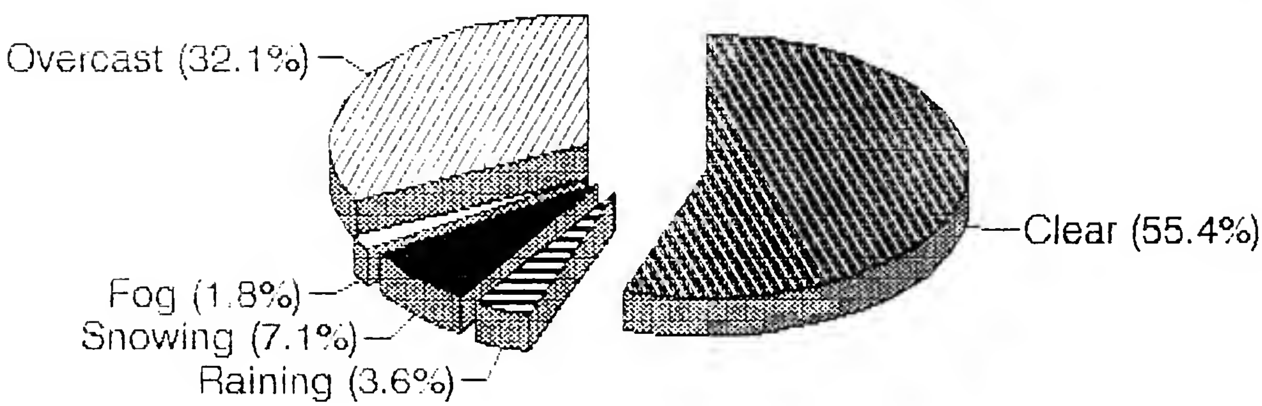
(Four year period)



Accidents by Weather Condition

Study Site: 60 and Over

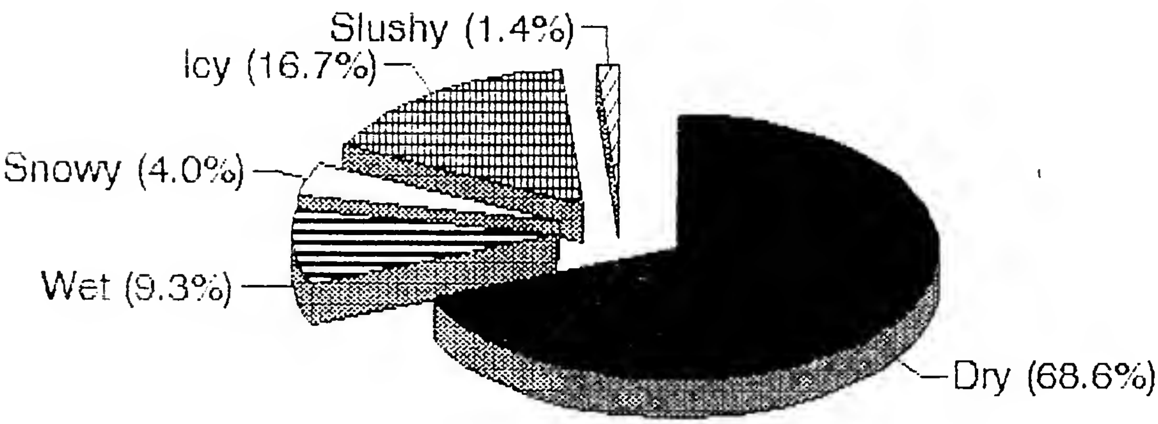
(Four year period)



Accidents by Road Condition

Statewide-Federal Aid: All Ages

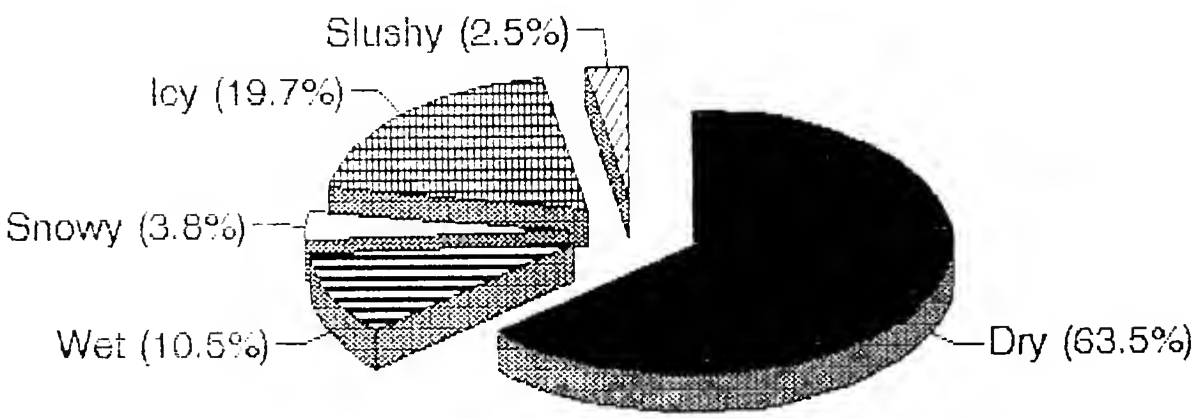
(Four year period)



Accidents by Road Condition

Study Site: All Ages

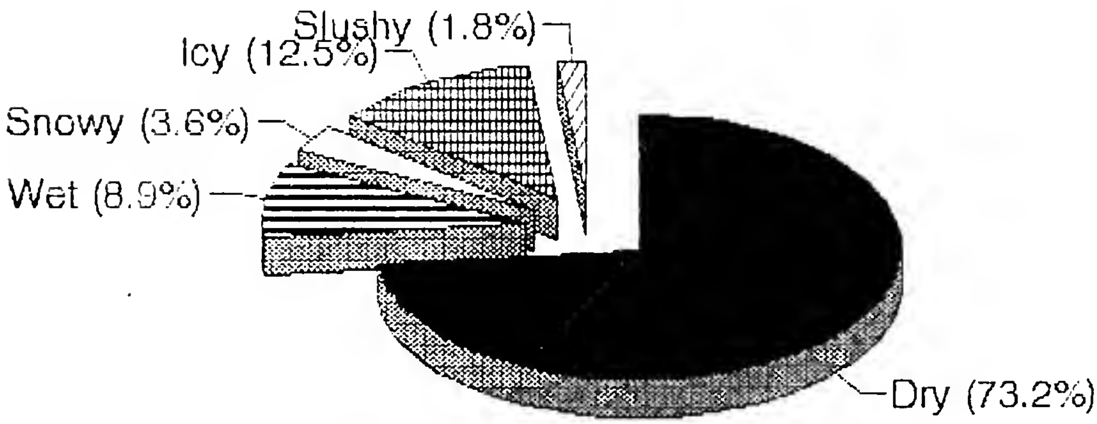
(Four year period)



Accidents by Road Condition

Study Site: 60 and Over

(Four year period)



Appendix D

Elderly Problem Review

Annually the Highway Traffic Safety Division produces and follows a plan. About three years earlier the division began focusing on particular segments of our driving population. A youth demonstration project was conducted two years ago. Last year they worked on older driver issues. The development of a multi-disciplinary safety task force has provided the opportunity to advance Highway Traffic Safety's initial efforts on US 93.

1. Demographic Data

Nationally and in Montana we are aging. Our older persons increased both in total numbers and as a larger percentage of our total population. This trend will influence the way highways are designed, built and negotiated. Some design standards adopted in the 1950's and 1960's and still used today do not address adequately the needs of today's drivers, particularly those of an aging population.

The 60 year old and older age group is the fastest growing population segment. In Montana from 1970 to 1990, the 60+ age group increased by 38% compared with 13% for the rest of the population. In the next two decades, respectively, there will be an estimated 23% and a 10% increase. These increases mean an older population of drivers on our roadways. Find in the appendix further information regarding the 60 year old and older population in cities along this corridor. As can be noted, currently the communities along US 93 have very high percentages of older citizens.

Nationally, transportation studies for older drivers examined those aged 65 years old or over. At the turn of the century about four percent of our population lived to be 65 years old. In 1984 some twelve percent of our population would reach 65 years of age. High birth rates in 1945 through 1970 and improved health care and medicine are cited as accounting for the rising ages of our citizens.

Today's aging population is a mobile group. They rely on the automobile increasingly as their principal transportation mode. Over 83% of their trips are by private vehicle, about 9% by walking, and slightly more than 2% by public transit. Taxis provide 2% of trips and an "other" category summarizes the remaining 4% of trips.

Shopping and personal trips account for over 50% of most older driver's trips nationwide. Generally, older persons travel little for work related trips. Older Montanans take similar trips and are more independent and mobile than their predecessors. Driving is their main transportation choice followed far behind by walking and mass transportation.

According to research on travel, older drivers travel fewer miles in a year than other age groups. However, the frequency of their trips is comparable to young drivers. Total miles traveled by older drivers increased because they retain their driver's license longer than former generations; this increases their risks from prolonged exposure to potential accidents. Census data show many older persons residing in suburban and rural areas which makes them rely more on the automobile. Since few suburban and rural areas are adequately served by public transit, future increases in rural transit systems seem unlikely given the prospects for budget increases. Montana portrays these same national trends.

Lake County and the cities of Polson and Ronan are major communities central to the study corridor. In 1990, Polson's population aged 60 years or older was 26% compared with about 17% for the United States and Montana. Lake County in 1990, was 20% elderly compared with about 17% for the U.S. and Montana. Comparatively, there is a higher concentration of older persons in this area.

In short, we are growing older. We're no longer the young society of 1900 with only a small percentage of our population age 65 years or older. Today, twelve percent of our nation and a little more in Montana are in this age group. By the year 2020, about 25 percent of us will be over 60 years of age. Researchers estimate that 70 percent of the people over 60 and 30 percent of those over 80 now retain and use their driver licenses. These numbers will grow in the future.

2. Aging and Driving

Driving today's modern roadways requires four crucial abilities:

1. to see and hear the traffic around us;
2. to anticipate, recognize and understand situations;
3. to decide how to react in each situation; and
4. to maneuver the vehicle safely.

Older populations enjoy relatively good health. Yet, certain physical and mental deficiencies develop from aging which affect our driving capabilities. Research shows that older Americans, as a class, tend to suffer decreased capabilities in vision and hearing, cognitive skills, movement, memory and major side effects of medications.

Chronological age does not reflect personal driving skills or abilities. Aging nevertheless raises questions of how well each of us performs the four distinct driving tasks noted before.

Fortunately, many are aware of their decreased driving skills due to aging and do compensate. Most older drivers curtail night driving, avoid complex intersections, drive slower and avoid high traffic and high speed traffic areas.

National research postulates the potential deficiencies for aging drivers as:

1. **Vision** - Aging commonly produces a loss of visual acuity beginning around age 55. Our ability to see fine detail and to focus declines. Peripheral vision lessens. We require much more illumination to see clearly but our increased sensitivity to glare makes it difficult to adjust to light. Each person's illumination need doubles every 13 years due to the pupil actually shrinking.

2. **Hearing** - Hearing impairment rises dramatically with age. An inability to hear high pitched sounds is a key symptom of hearing loss. If it is difficult to hear sirens, train whistles and vehicle horns, a driver may be a greater risk. Fortunately, this impairment may not be as critical as others in performing driving tasks noted earlier.

3. **Physical** - As we age we are more limited in our mobility and agility. Decreases in the speed of our physical response due to muscular changes can be compensated for, but are compounded by problems of slower decision making. Decreased motor skills for driving performance may be compensated for in some ways. But we should remember as pedestrians, aging causes us to walk much slower than younger people; crossing streets requires more time.

4. **Mental** - Aging slows us down mentally. As we age we need more time to process road related information. We may make decisions readily but we make them less quickly than younger persons. At times aging causes us to become less attentive to driving tasks. Some drivers become forgetful and even suffer forms of dementia.

3. Accidents

Aging means we are more at risk than younger persons in all motor vehicle accidents as driver, occupant or pedestrian. More aged drivers will add to all of the older persons' accident rates. Aging is reflected in an over-representation in certain types of highway accidents.

Nationally, accident rates increase around 60 years of age and rise rapidly from age 69 years and older. The total number of crashes for this older driving group is small. Their involvement rate in accidents is high for those aged 75 and over per groups of 1000 population. Accident involvement rates per-mile-traveled increases around 60 years of age and by age 74 and above approaches the young drivers' high involvement rate.

Drivers over age 65 were found to be over-involved in multi-vehicle accidents. They are over-involved too, in injury crashes that were caused by a failure to yield the right-of-way. Also they are over-represented in accidents involving right-left turns, backing, parking and head-on collisions.

Aging produces problems for drivers. While the chronological age of any driver <u>does not</u> predict specific problems in driving, aging raises the issue of when each of us must decide to give up driving as one source of our independence and mobility. Older drivers will continue to be over-represented in the previously noted accident statistics, particularly the types and frequency of accidents for miles traveled.

Appendix E

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